Avaya 1600 Series IP Deskphones

Installation and Maintenance Guide

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Interference

Using a cell, mobile, or GSM telephone, or a two-way radio in close proximity to an Avaya IP Telephone might cause interference.

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Chapter 1: Introduction

About This Guide

This guide describes how to install and maintain the Avaya 1600 Series IP Deskphone product line and troubleshoot telephone problems.

The 1600 Series IP Deskphone product line supports only the H.323 signaling protocol and work with Avaya Aura™ Communication Manager Release 3.0 or later call servers and Avaya Aura Communication Manager Branch Release 1.1 or later call servers. (Avaya Aura Communication Manager was formerly known as Avaya Distributed Office.)

Note:

Unless otherwise indicated, generic references in this document to a server can apply to DEFINITY® servers, MultiVantage servers, Avaya Aura Communication Manager media servers, or Avaya Aura Communication Manager Branch systems.

Note:

Any reference to HTTP in this guide applies equally to HTTPS.

Intended Audience

This document is intended for personnel who install and administer the 1600 Series IP Deskphones.

CAUTION:

Avaya does not support many of the products mentioned in this document. Take care to ensure that there is adequate technical support available for the servers involved, including, but not necessarily limited to, HTTP, HTTPS, and DHCP servers. If the servers are not functioning correctly, the IP telephones might not be able to operate correctly.

Document Organization

The guide contains the following sections:

Chapter 1: Introduction	Provides an overview of this guide.
Chapter 2: 1600 Series IP Telephone Installation	Describes the equipment and resources required to properly install and operate the 1600 Series IP Deskphones. Provides instructions on installing the telephones out of the box.
Chapter 3: Local Administrative Options	Describes how to set local administrative options, if requested by the system or LAN administrator.
Chapter 4: Maintaining 1600 Series IP Telephones	Describes maintenance actions like downloading telephone software from the Avaya support Web site and customizing system values.
Chapter 5: Troubleshooting Guidelines	Describes error conditions and messages that might occur during the installation of the 1600 Series IP Deskphones.
Appendix A: Restart Scenarios	Explains the different scenarios possible for the sequence of the restart process.
Appendix B: Glossary of Terms	Provides a glossary of terms used in this document or which are generally applicable to 1600 Series IP Deskphones.
Appendix C: Related Documentation	Provides references to external documents that relate to telephony in general, and can provide additional information about specific aspects of the telephones.

Other Documentation

See the Avaya support site at _____ for 1600 Series IP Deskphone technical and end user documentation.

The following documents are available for the 1600 Series IP Telephones:

- *Avaya 1600 Series IP Deskphones Installation and Maintenance Guide*, Document Number 16-601438.
- *Avaya one-X™ Deskphone Value Edition 1600 Series IP Telephone Pre-Installation Checklist*, Document Number 16-601439.
- *Avaya one-X™ Deskphone Value Edition 1600 Series IP Telephone Safety Instructions*, Document Number 16-601440.

- *Avaya one-X™ Deskphone Value Edition 1600 Series IP Telephones BM32 Button Module Installation and Safety Instructions*, Document Number 16-601441.
- *Avaya one-X™ Deskphone Value Edition 9600 Series IP Telephone Application Programmer Interface (API) Guide*, Document Number 16-601442.
- *Avaya 1600 Series IP Deskphones Telephone Administrator Guide*, Document Number 16-601443.
- *Avaya 1603/1603SW/1603-I/1603SW-I IP Deskphone User Guide*, Document Number 16-601444.
- *Avaya 1608/1608-I IP Deskphone User Guide*, Document Number 16-601446.
- *Avaya 1616/1616-I IP Deskphone User Guide*, Document Number 16-601448.
- *Avaya one-X™ Deskphone Value Edition 1600 Series IP Telephones BM32 Button Module User Guide*, Document Number 16-601450
- *Avaya one-X™ Deskphone Value Edition 1603 IP Telephone Wall Mount Instructions*, Document Number 16-601453.
- *Avaya one-X™ Deskphone Value Edition 1608/1616 IP Telephone Wall Mount Instructions*, Document Number 16-601933.
- *Avaya 1603/1603SW/1603-I/1603SW-I IP Deskphone Quick Reference*, Document Number 16-601445.
- *Avaya 1608/1608-I IP Deskphone Quick Reference*, Document Number 16-601447.
- *Avaya 1616/1616-I IP Deskphone Quick Reference*, Document Number 16-601449.

See Appendix C: Related Documentation for a list of non-Avaya documents, such as those published by the Internet Engineering Task Force (IETF) and International Telecommunication Union (ITU).

Customer Support

For 1600 Series IP Deskphone support, call the Avaya support number provided to you by your Avaya representative or Avaya reseller.

Information about Avaya products can be obtained at the following URL:

Chapter 2: 1600 Series IP Telephone Installation

Introduction

The 1600 Series IP Telephone product line uses Internet Protocol (IP) technology with Ethernet interfaces. The IP telephones supplement the existing Avaya IP Solutions platform.

The 1600 Series IP Telephones support DHCP and HTTP/HTTPS over IPv4/UDP which enhance the administration and servicing of the telephones. These telephones use DHCP to obtain dynamic IP addresses, HTTP or HTTPS to download customized settings for the telephones, and HTTP only to download the new software version.

The 1603SW, 1603SW-I, 1608, 1608-I, 1616, and 1616-I IP Telephones provide the ability to have one IP connection on the desktop for both a telephone set and a PC using an Ethernet switch. The 1603 and 1603-I IP Telephone do not provide a secondary Ethernet connection for a PC.

In compliance with Australian law, the following information is provided:

> This equipment shall be installed and maintained by trained service personnel. All the input/output ports are classified as Safety Extra Low Voltage (SELV, in the meaning of IEC 60950). To maintain safety compliance when connecting the equipment electrically to other equipment, the interconnecting circuits shall be selected to provide continued conformance of clause 2.3 for SELV circuits (generally, double/reinforced insulation to 240Vac rms to any primary/mains circuitry and 120Vac rms to any telecommunications network circuitry). To ensure that these conditions are adhered to, interconnect the equipment only with the already approved/certified equipment.

IP Telephone Models

There are seven telephone set models and a button module currently defined in the 1600 Series IP Telephone family:

Model	Call Appearance/ Line Appearance/ Feature Buttons	Display Size
• 1603 IP Telephone	3	2 row by 16 column display
• 1603SW IP Telephone	3	2 row by 16 column display
• 1603-I IP Telephone	3	2 row by 16 column display
• 1603SW-I IP Telephone	3	2 row by 16 column display
• 1608 IP Telephone	8	3 row by 24 column display
• 1608-I IP Telephone	8	3 row by 24 column display
• 1616 IP Telephone	16	4 row by 24 column display
• 1616-I IP Telephone	16	4 row by 24 column display
• BM32 Button Module	32	No display

The 1603SW, 1603SW-I, 1608, 1608-I, 1616, and 1616-I telephones have an internal Ethernet switch that allows the telephone and a PC to share the same LAN connection, if appropriate. Thus, these 1600 models do not need, or work with, the 30A switched hub interface.

This document describes the installation of these telephones and post-installation maintenance issues. For details about using the features provided by the telephones, see the user documentation for each telephone. For information about desk or wall mounting any of the 1600 Series IP Telephones, see the instructions boxed with the telephone. Wall or desk mount instructions are also available on the Avaya support Web site _____

Software

As shipped from the factory, the 1600 Series IP Telephone may not contain the most up-to-date software for registration and operation. When the telephone is first plugged in, a software download from an HTTP server might be initiated. The software download gives the telephone upgraded functionality.

For subsequent downloads of software upgrades, the Avaya Media Server provides the capability for a remote restart of the IP telephone. As a consequence of restarting, the telephone automatically restarts reboot procedures which result in a download if new software

is available. Chapter 4: Maintaining 1600 Series IP Telephones covers downloading new software releases.

Pre-Installation Checklist

Before plugging in the 1600 Series IP Telephone, verify that all the following requirements are met. Failure to do so prevents the telephone from working properly and can have a negative impact on the network. Print copies of this checklist for each server and IP telephone.

Verify These Network Requirements

❑ **1.** Ensure that the LAN uses Ethernet Category 5e cabling running the IPv4 version of Internet Protocol.

❑ **2.** Avaya Aura Communication Manager Release 3.0 or later software supports the 1600 Series IP Telephones, aliased as 4600 Series IP Telephones. Specifically, all of the 1603 models should be aliased as a 4610, all of the 1608 models should be aliased as a 4610, and all of the 1616 models should be aliased as a 4620.

Avaya Aura Communication Manager Release 5.2 or later software provides native support for the 1600 Series IP Telephones (that is, you do not have to alias the telephones).

Avaya Aura Communication Manager Branch provides native support for the 1600 Series IP Telephones.

❑ **3.** For Avaya Aura Communication Manager, the following circuit packs are installed on the switch:

- TN2602 or TN2302 IP Media Processor circuit pack. Sites with a TN2302 IP Media Processor circuit pack are strongly encouraged to install a TN2602 circuit pack to benefit from the increased capacity.
- TN799B, C, or D Control-LAN (CLAN) circuit pack.

Important:

IP telephone firmware Release 1.0 or greater requires TN799C V3 or greater CLAN circuit pack(s). For more information, see the *Avaya Aura Communication Manager Software and Firmware Compatibility Matrix* on the Avaya support Web site

❑ **4.** For Avaya Aura Communication Manager, the Avaya Media Server is configured correctly, as described in the *Avaya 1600 Series IP Deskphones Administrator Guide* and Avaya Aura Communication Manager documentation. Both documents are available at

For Avaya Aura Communication Branch, see the Avaya Aura Communication Manager Branch Device Manager online help.

❑ **5.** The DHCP server and application are administered as described in the *Avaya 1600 Series IP Deskphones Administrator Guide*.

Verify These Network Requirements (continued)

- ❑ **6.** The HTTP server and application are administered as described in the *Avaya 1600 Series IP Deskphones Administrator Guide*.
- ❑ **7.** The upgrade script and application files from the Avaya Support Web site, _____, are loaded correctly on the HTTP/HTTPS server.
- ❑ **8.** If applicable, the DNS server is administered as described in the *Avaya 1600 Series IP Deskphones Administrator Guide*.

Notes:

- Any or all of the server applications mentioned in items 5-8 can be co-resident on the same hardware, subject to the specific restrictions of each individual application.
- See the *Avaya 1600 Series IP Deskphones Administrator Guide* for more information about:
  - administering other network equipment,
  - administering applications like firewalls, and
  - information about topics like port utilization.

Requirements to Verify for Each IP Telephone

- ❑ **9.** You have an extension number and an Avaya Aura Communication Manager or Avaya Aura Communication Manager Branch security code (password) for each applicable IP telephone. If your call server supports unnamed registration, and the telephone settings file allows unnamed registration, you do not need to provide an extension or password for the telephone. However, if you do not provide an extension or password, the telephone will have very limited telephone functionality. (For information, see Unnamed Registration on page 27.)
- ❑ **10.** A Category 5e LAN jack is available at each telephone site.
- ❑ **11.** Electrical power is provided to each telephone by a Telephone Power Module (DC power jack) (must be ordered separately). For Power over Ethernet input connection, use only with UL Listed I.T.E. equipment with Power over Ethernet output. If the LAN will supply IEEE-standard power to the telephone, no power module is required for 1608, 1608-I, 1616, and 1616-I telephones. For the 1603 and 1603-I telephones, you will need to use the Power over Ethernet adapter if the LAN will supply IEEE-standard power to the telephone. (See Connection Jacks with Power over Ethernet on a 1603/1603-I IP Telephone on page 17.)
- ❑ **12.** 1 Category 5e modular line cord is available for the connection between the IP telephone and the PC, if applicable.
- ❑ **13.** Verify that the 1600 Series IP Telephone package includes the following components:
  - 1 telephone set with stand.
  - 1 handset capable of transmitting and receiving 7KHz audio.
  - 1 H4DU 9-foot long (when extended) 4-conductor coiled handset cord, plugged into the telephone and the handset.
  - 1 8.5"x11" sheet of labels
  - *1600 Series IP Telephone Safety Instructions.*
  - *1600 Series IP Telephone Quick Reference.*

  You will need 1 Category 5 modular line cord for the connection from the IP telephone to the Ethernet wall jack.

Note:

For sites using headsets, the 1608 IP Telephone and the 1616 IP Telephone support only the HIS headset cords. The 1603 IP Telephone does not support headsets.

Assembling the 1600 Series IP Telephone

CAUTION:

Be careful to use the correct jack when plugging in the telephone. The jacks are located on the back of the telephone housing and are flanked by icons to represent their correct use.

Powering the 1600 Series IP Telephone

All 1600 Series IP Telephones can be locally powered with a Telephone Power Module (DC power jack), available separately. The DC input rating is 5 VDC, 2A. In addition, the telephones support IEEE 802.3af-standard LAN-based power. (To use LAN-based power with a 1603 telephone, you must use a Power over Ethernet adapter.) Before installing a 1600 Series IP Telephone, verify with the LAN administrator whether the LAN supports IEEE 802.3af, and if so, whether the telephone should be powered locally or by means of the LAN.

Note:

The last step in assembling the 1600 Series IP Telephone **must** be applying power. Apply power either by plugging the power cord into the power source (local powering) or plugging the modular line cord into the Ethernet wall jack (IEEE powering). Do not use the 1151 power adapter with these telephones.

Note:

For Brazilian user when using the 5V power adapter:
For the user's safety and to avoid electric shock, this equipment must be connected to a grounded (three pin) electrical network power outlet according to Standard NBR ABNT 5410.

Este equipamento deve ser conectado obrigatoriamente em tomada de rede de energia eletrica que possua aterramento (tres pinos), conforme a Norma NBR ABNT 5410, visando a seguranca dos usuarios contra choques eletricos.

CAUTION:

Failure to connect the proper cables with the proper jacks might result in an outage in part of your network.

Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, and Figure 7 provide illustrations to connect cords to jacks on 1600 Series IP Telephones. Use the illustrations and associated procedures as appropriate for telephone assembly.

Telephone Model:	See:
1603	Figure 1 and Figure 2
1603-I	Figure 1 and Figure 2
1603SW/1603SW-I	Figure 3
1608	Figure 4 and Figure 5
1608-I	Figure 4 and Figure 5
1616	Figure 6 and Figure 7
1616-I	Figure 6 and Figure 7

Figure 1: Connection Jacks with Power over Ethernet on a 1603/1603-I IP Telephone

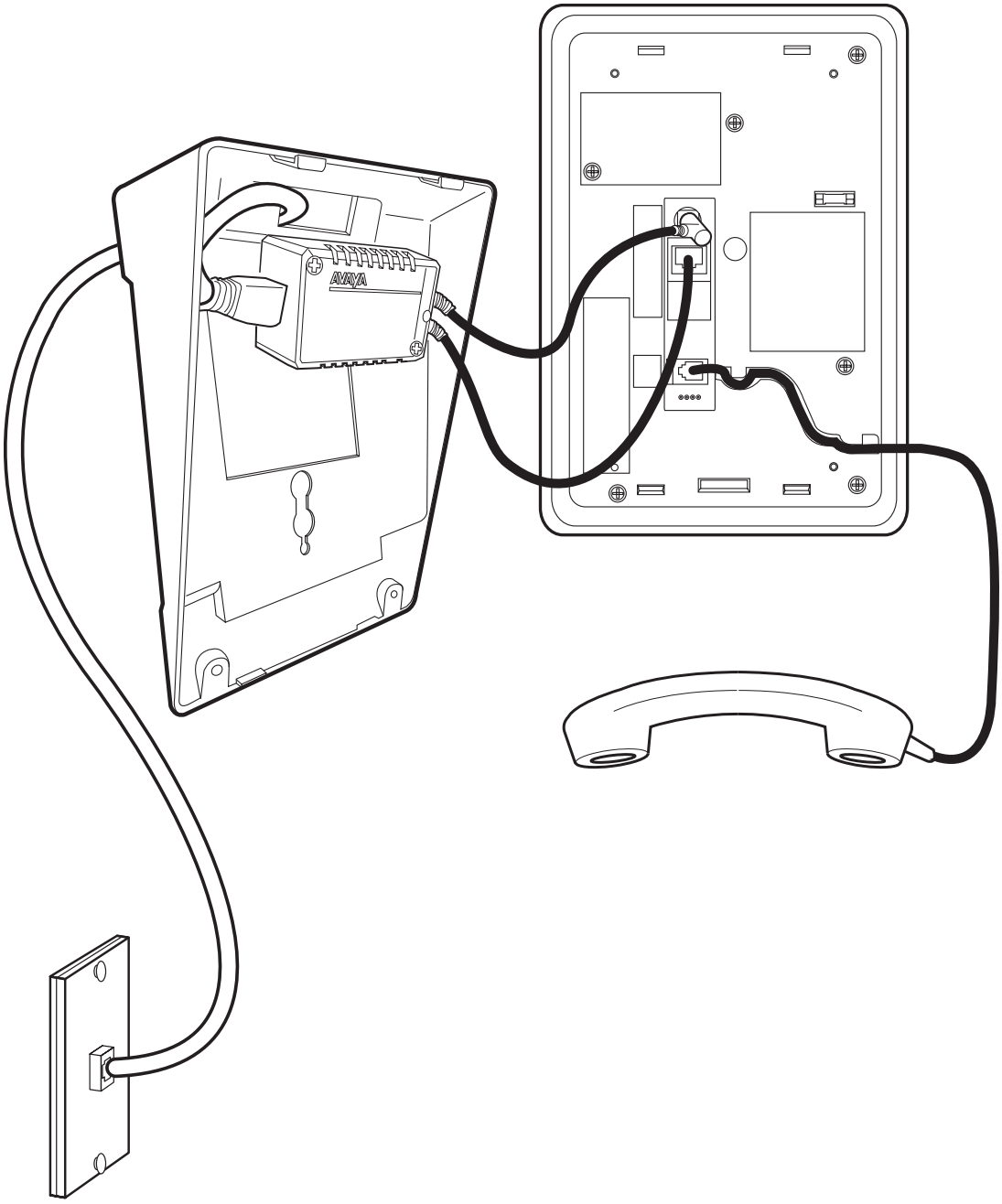


Figure 2: Connection Jacks with Local Power on a 1603/1603-I IP Telephone

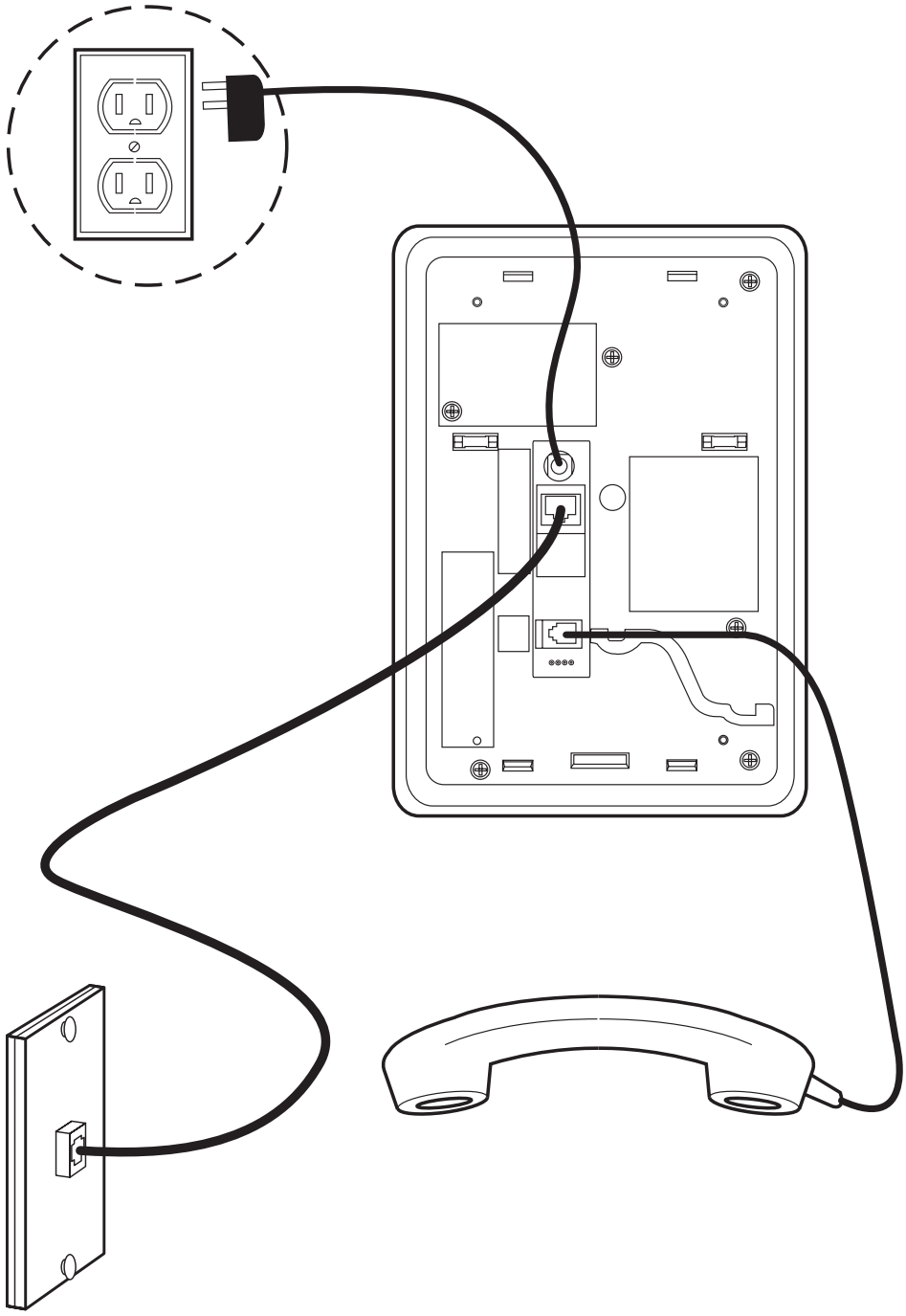


Figure 3: Connection Jacks on a 1603SW/1603SW-I IP Telephone

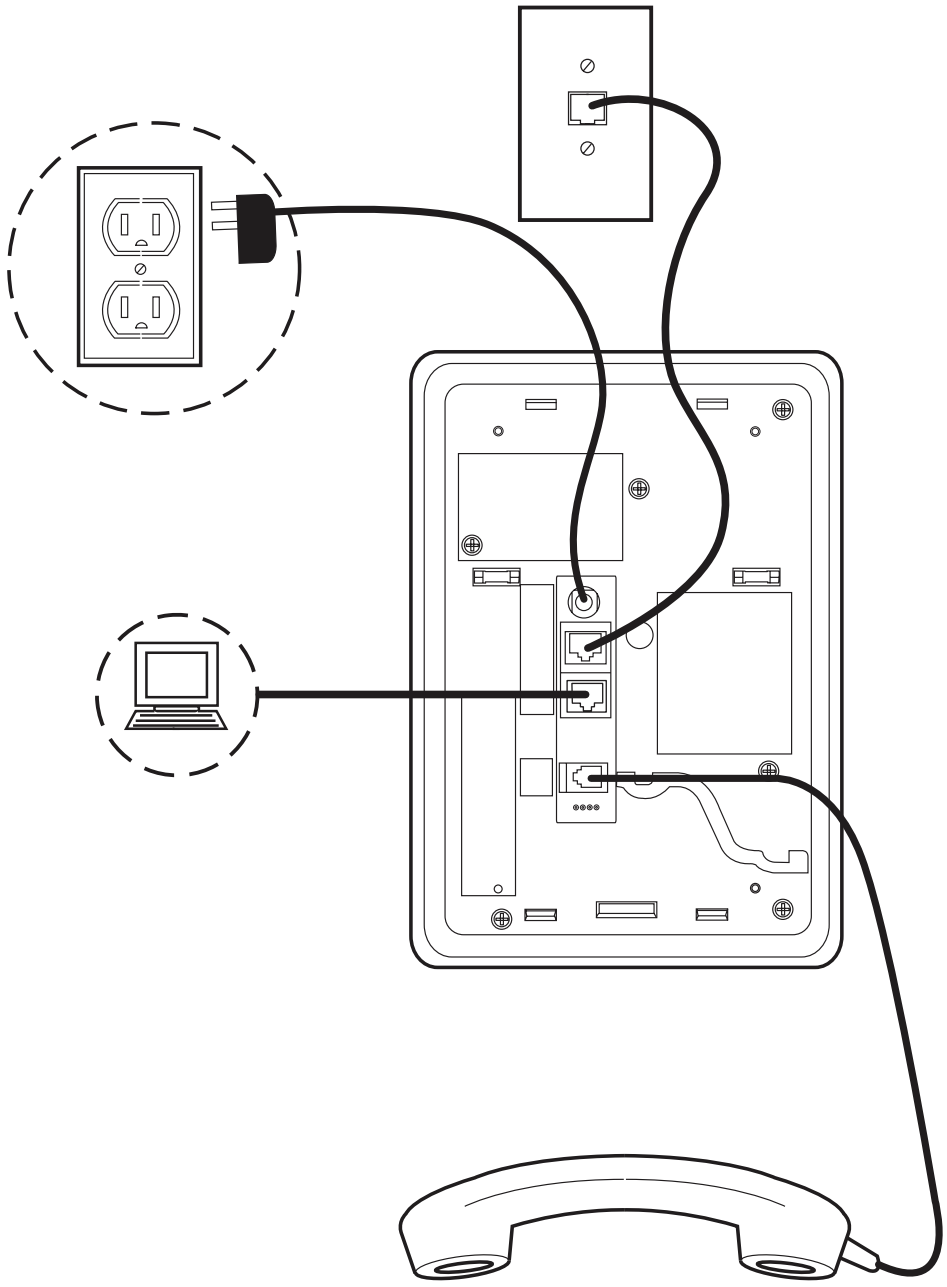


Figure 4: Connection Jacks with Power over Ethernet on a 1608/1608-I IP Telephone

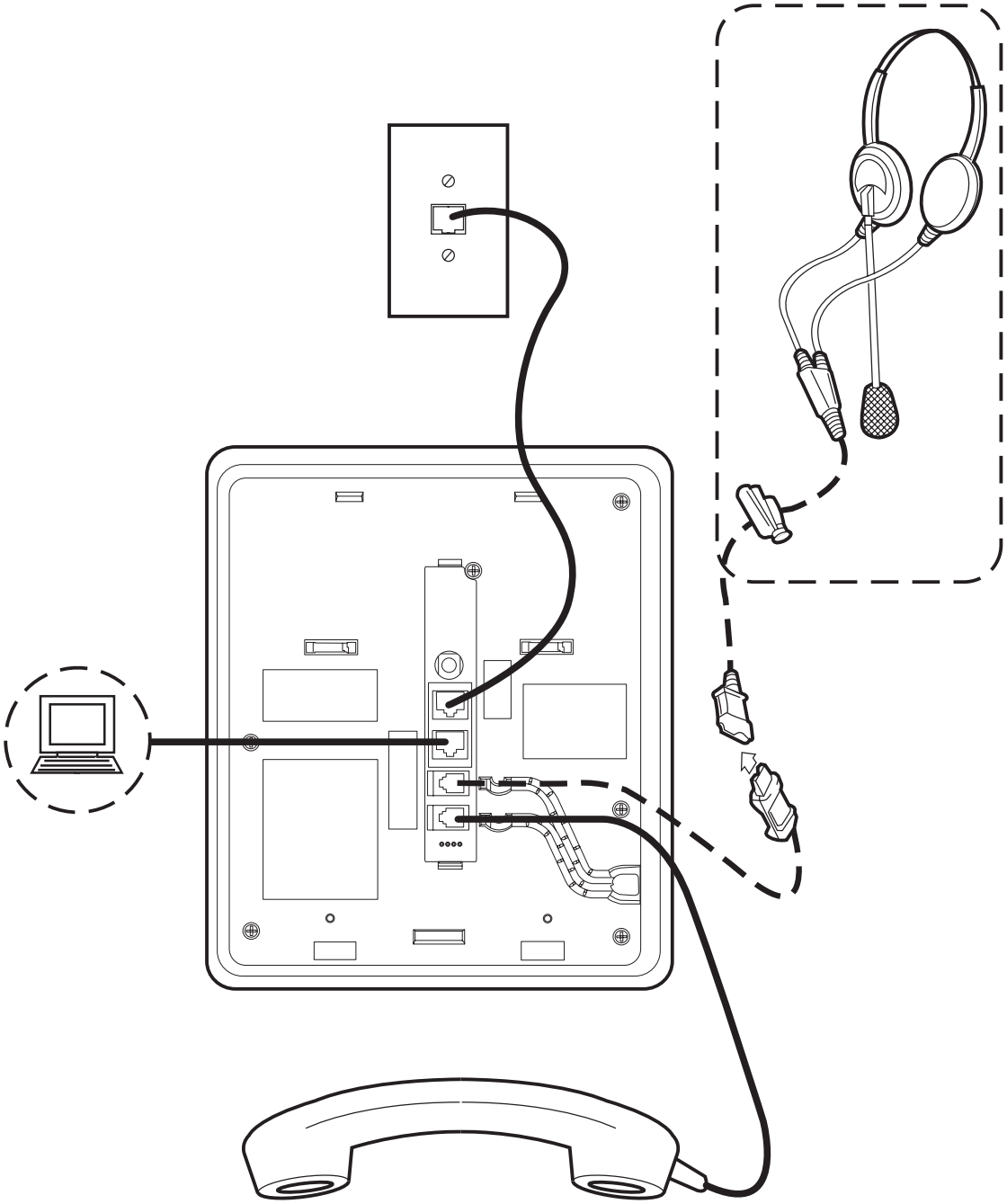


Figure 5: Connection Jacks with Local Power on a 1608/1608-I IP Telephone

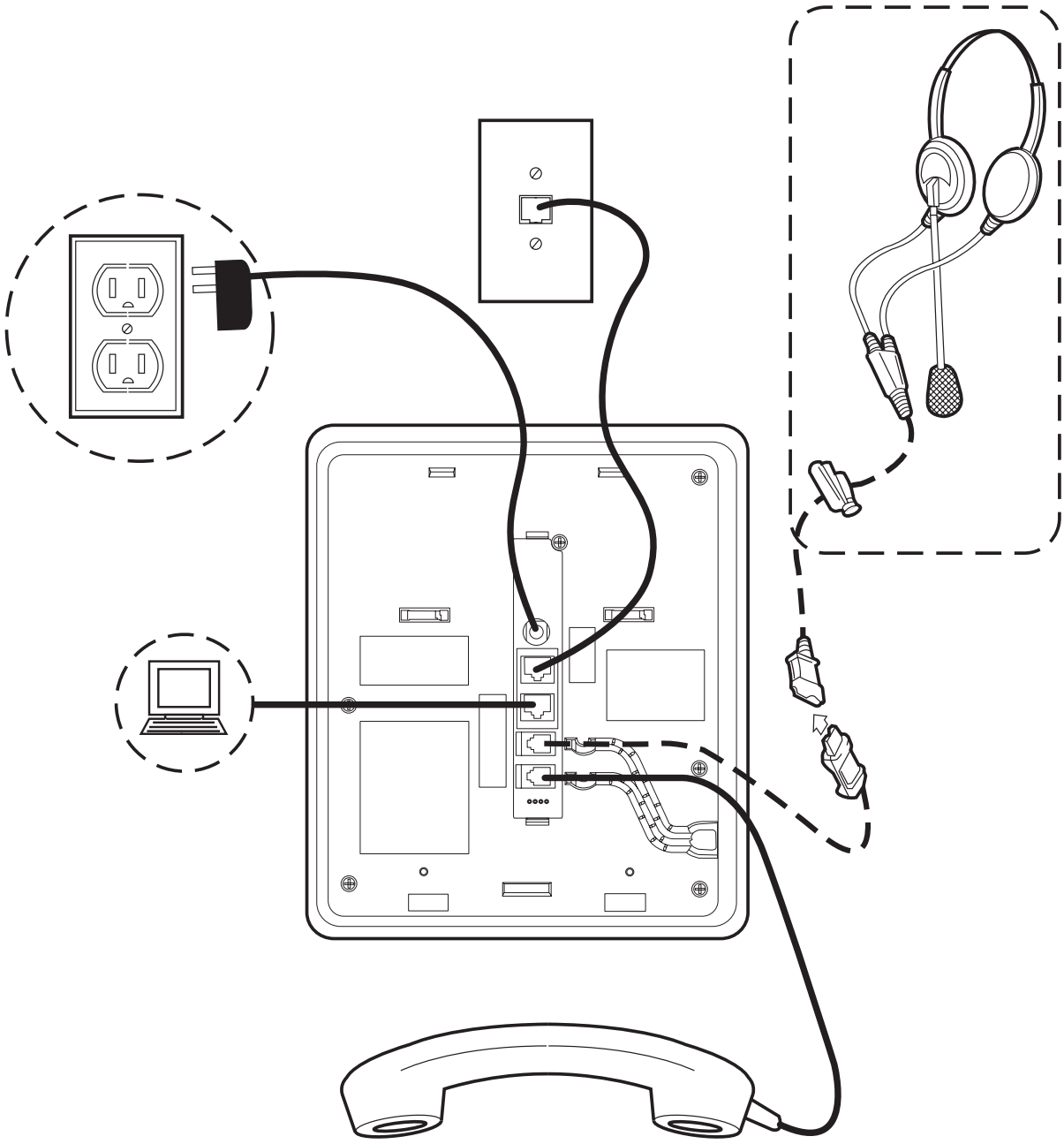
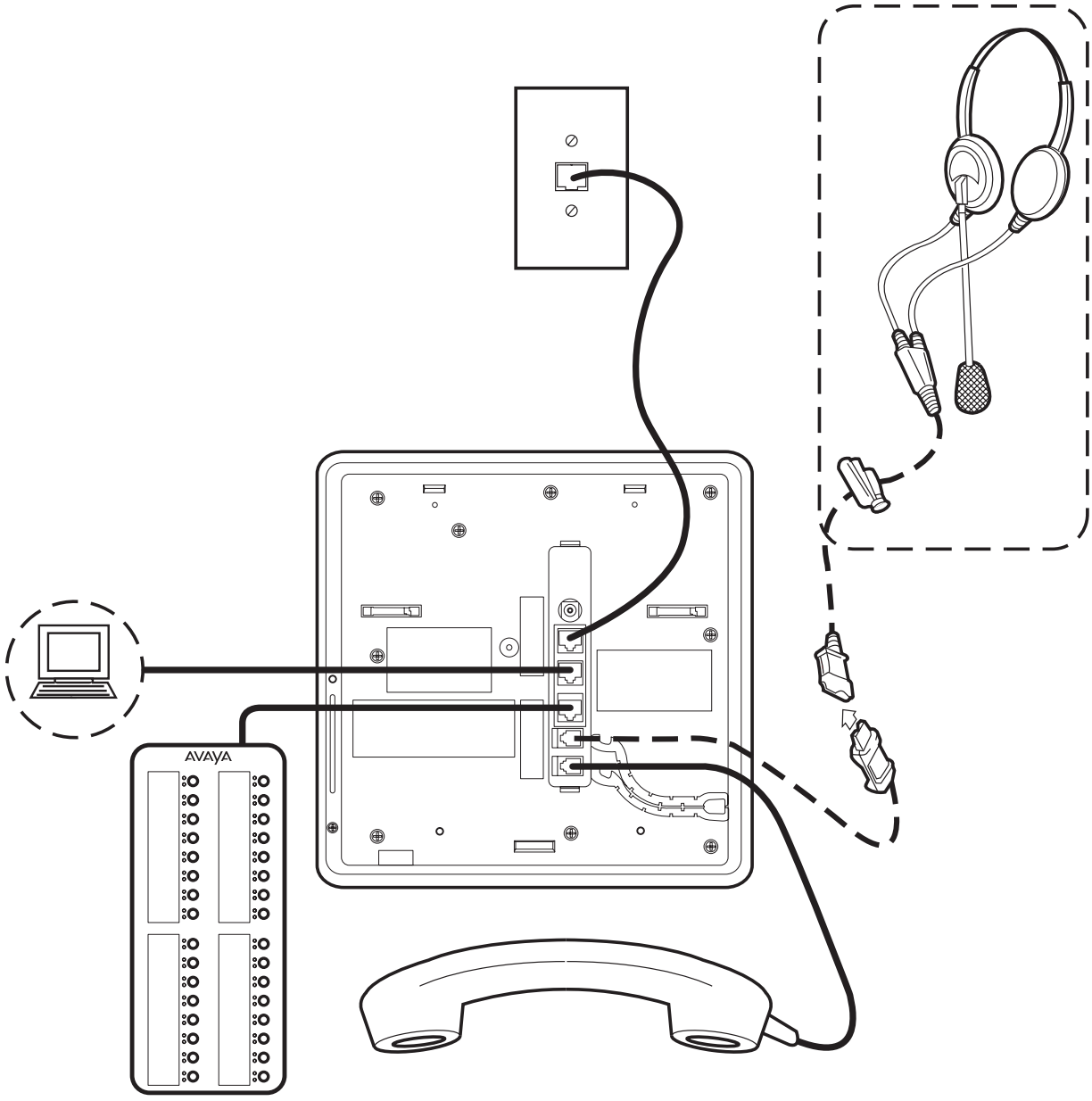


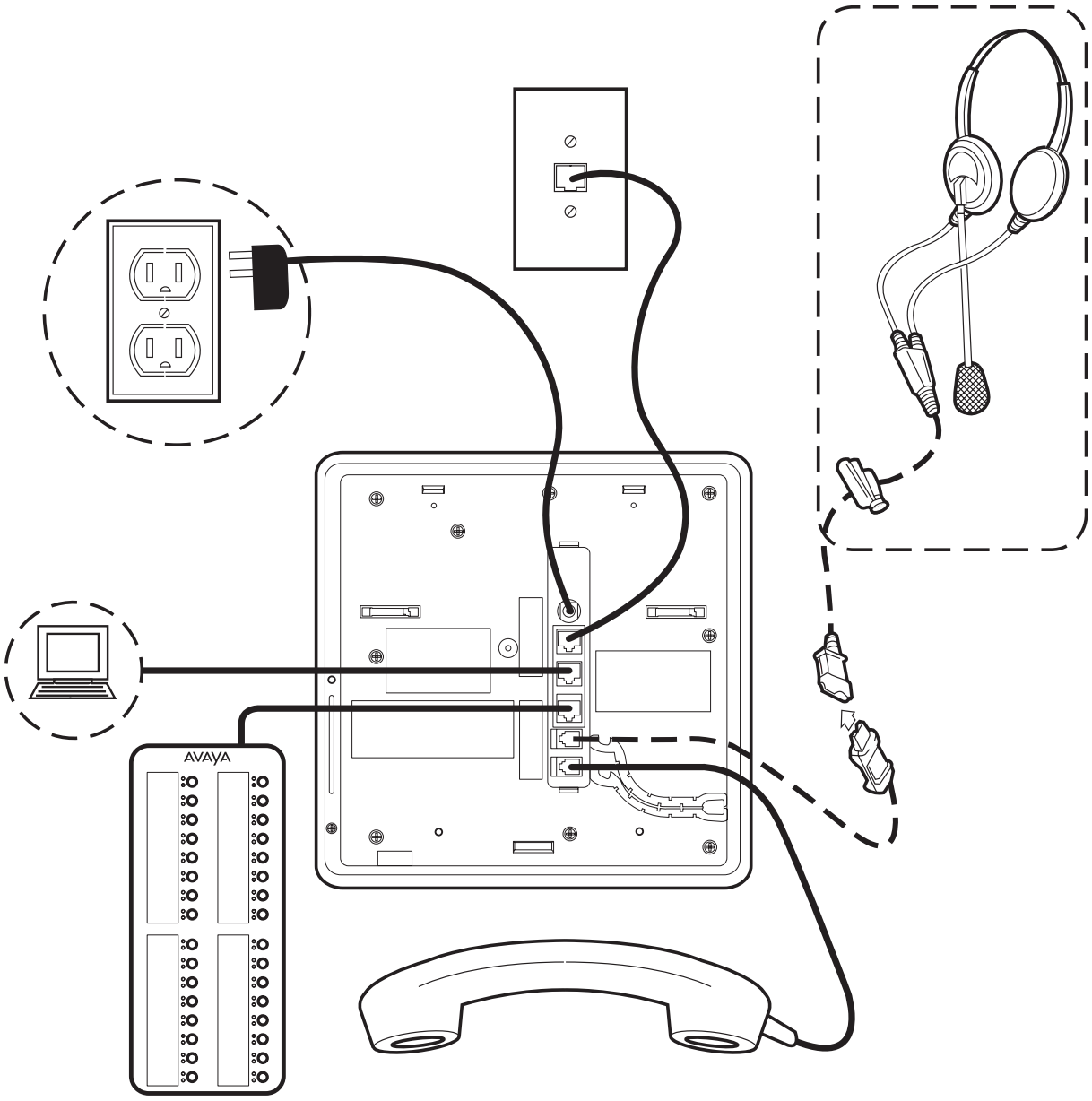
Figure 6: Connection Jacks with Power over Ethernet on a 1616/1616-I IP Telephone



Note:

The BM32 Button Module shown in the lower left corner can also be attached to the telephone with the connector packaged with the module.

Figure 7: Connection Jacks with Local Power on a 1616/1616-I IP Telephone



Note:

The BM32 Button Module shown in the lower left corner can also be attached to the telephone with the connector packaged with the module.

1. Plug one end of the first Category 5 modular line cord into the Ethernet jack of the PC and the other end into the secondary Ethernet jack on the 1600 Series IP Telephone, if appropriate.
2. Plug one end of the second Category 5 modular line cord into the Ethernet jack on the 1600 Series IP Telephone. Plug the other end of this cord into the Ethernet wall jack. If the telephone is to be IEEE-powered, you are finished. Do not proceed to Step 3.
3. **If the telephone is to be powered locally**, plug the power cord into the 1600 Series IP Telephone and the power cord plug into the wall socket.

Dynamic Addressing Process

Note:

Before starting this process you must have an extension number for the IP telephone and the Avaya Aura Communication Manager security code (password) for that extension, unless the telephone will use unnamed registration. For more information, see Unnamed Registration on page 27.

Any reference to the HTTP server applies equally to an HTTPS server.

The following description of the process of installing the IP telephones assumes that the process is executed successfully. Only an initial out of the box installation is described. For errors that might be encountered during the process and the messages displayed, see Chapter 5: Troubleshooting Guidelines.

When you plug the IP telephone set into the Ethernet wall jack and apply power, if applicable, the following process takes place.

Note:

If the application has already been downloaded, the whole process takes approximately 1 to 2 minutes after the telephone is plugged in. For software upgrades, including the boot file and application file download, the process might take 5 - 10 minutes. The duration is based on LAN loading, how many telephones are being installed at once, and similar factors.

Do not unplug the power cord during the download process.

1. The telephone activates the Ethernet line interface, the PC Ethernet jack, and dial pad input to allow the invocation of procedures. The activation occurs as soon as possible after power-up or a reset.

   The telephone displays the speed of the Ethernet interface in Mbps, that is, 10 or 100. The message `No Ethernet` displays until the software determines whether the interface is 10 Mbps or 100 Mbps.

Note:

The Ethernet speed indicated is the LAN interface speed for both the telephone and any attached PC, assuming the administrator has not disabled the latter interface by a PHY2STAT setting.

2. The IP telephone sends a request to the DHCP server and invokes the DHCP process.

   One of the following messages display:

DHCP: *s* secs * to program	**DHCP: *s* secs VLAN ID = *n***	**DHCP: *s* secs**

   where ***s*** is the number of seconds that have elapsed since DHCP was invoked. The message on the left appears if 802.1Q tagging is off and access to local programming procedures is not disabled or restricted. (See Chapter 3: Local Administrative Options for specifics.) The middle message appears if 802.1Q tagging is on and access to local programming procedures is disabled or restricted. If the left and middle messages alternate every two seconds, 802.1Q tagging is on. When both messages alternate, access to local programming procedures is not disabled or restricted. Finally, the message on the right appears if 802.1Q tagging is off and access to local programming procedures is disabled or restricted.

3. The DHCP server provides IP addresses for the following hardware:
   - The IP telephone
   - The HTTP/HTTPS server
   - The TN799C or D Control-LAN (CLAN) circuit pack on the media server
4. Using the list of gateway IP addresses provided by the DHCP server, the telephone performs a router check. The telephone cycles through the gateway IP addresses with ARPs or pings until it receives a response. When the router is located, the HTTP/HTTPS process starts.
5. While the IP telephone connects to the HTTP/HTTPS server, the telephone displays the following message:

HTTP:*n* *ipadd*

   where ***n*** is the number of the IP address obtained from the HTTP/HTTPS server and ***ipadd*** is the IP address.

6. When connected, the telephone looks for an upgrade script file.

7. The HTTP/HTTPS server sends and identifies an upgrade script.

   The GET message might have to be sent several times. Each time the GET message is sent, all IP telephones display one of the following messages:

   ```
   HTTP: n uri
   ```

   For HTTP, ***n*** is the number of HTTP requests made by the telephone and **uri** is the URI for the current HTTP request.

8. While the upgrade script file is being downloaded, all IP telephones display the following message:

   ```
   HTTP:n sc etag
   ```

   where ***n*** is the number of the IP address obtained from the HTTP server, *sc* is the status code of the HTTP response and *etag* is the value of the ETag header.

9. While the application file is saved in flash memory, all IP telephones display the following message:

   ```
   Saving to flash
   1%, 1 secs
   ```

   with the percentage of the file and the number of elapsed seconds incremented as the application file is stored in flash memory.

10. The telephone contacts the Avaya Media Server and attempts to log in.

    All IP telephones display the following prompts for an extension:

    ```
    Enter Extension
    EXT= #=OK
    ```

11. Enter a new extension and press **OK**. To register the telephone without the extension or password (unnamed), press only **OK** or make no entry and wait 60 seconds.

    Note:

    Unnamed registration is the capability to register a telephone with the call server without entry of an extension or password. The UNNAMEDSTAT parameter must be set to enable unnamed registration. Telephones registered unnamed have limited functionality. For more information, see Unnamed Registration.

    All IP telephones display the following prompt for a password:

Login
Enter Password
Enter Password and press Enter or OK

12. Enter the password and press **OK**. To register the telephone without the extension or password (unnamed), press **OK** or make no entry and wait 60 seconds.
13. The extension is visible as you enter it but the password displays as asterisks. The system determines whether the extension is in use.
14. Successful completion of this process produces a dial tone when the Speaker button is pressed or the handset is lifted.

    The IP telephone was installed successfully.

Unnamed Registration

Unnamed registration is a capability an IP telephone can have to register with a call server, and receive limited service, without requiring an extension and password entry. Typical environments where this functionality is useful include:

- “Hot-desking” environments where there is a period of time between one user logging out and another user logging in on the same telephone.
- Using the Avaya Softphone application in “road warrior” mode, which allows a traveller to invoke the telephony features and functionality by taking over the office telephone extension. This takeover unregisters the office telephone.

In both examples, the user unregisters the telephone by logging off or by taking the office telephone extension over to another telephone. Without unnamed registration, the telephone in the first example will just wait for an extension and password entry and the telephone in the second example will continue attempting to register at regular intervals. The downside of a telephone being unregistered is that no one can use the telephone, for example, to report a building emergency like a fire.

Unnamed registration allows the telephone to register without an extension and password. Because there is no extension, telephony functionality is limited, specifically:

- The user has only one call appearance, and hence, cannot transfer or conference calls.
- The user has no administered feature buttons, and cannot invoke on-hook dialing.
- Extension-based information, like a given user's Contacts data or Option settings are not available.
- The user is limited to the calling capability administered for PSA (Personal Station Access) on the call server, for example, access to an emergency number.

Unless otherwise disabled, the telephone automatically attempts to register unnamed if no action is taken on the telephone Extension entry screen within 60 seconds. Initiating any ID or password entry disables and prevents unnamed registration from occurring. Unnamed registration is ignored after any dialpad entry.

Administrators can disable unnamed registration by appropriately administering the system parameter UNNAMEDSTAT, as indicated in Chapter 7 of the *Avaya 1600 Series IP Deskphones Administrator Guide*. Unnamed registration appears to the end user like Avaya Aura Communication Manager TTI Mode, and is similar from an administration perspective. For more information about TTI, see your Avaya Aura Communication Manager documentation.

Printing Button Labels

You can download software from www.desi.com that enables you to print button labels for the 1600 series telephones. To download this software, perform the following steps:

1. Using your web browser, go to **www.desi.com**.
2. Click **DESI downloads**.
3. Download the appropriate application.

If you are using Avaya Aura Communication Manager Branch, you can export the button settings from Avaya Aura Communication Manager Branch Device Manager and import the settings into the DESI application. For more information, see the Avaya Aura Communication Manager Branch Device Manager online help.

Chapter 3: Local Administrative Options

Introduction

After you have successfully installed an IP telephone, you might be instructed to administer one of the options described in this chapter.

Note:

You can modify the settings file to set parameters for IP telephones that download their upgrade script and application files from the same HTTP server. See Chapter 4: Maintaining 1600 Series IP Telephones and “1600 Series IP Telephone Scripts and Application Files” in Chapter 4 of the *Avaya 1600 Series IP Deskphones Administrator Guide*.

CAUTION:

Perform these procedures **only** if instructed to do so by the system or LAN administrator.

Static administration of these options causes upgrades to work differently than if they are administered dynamically. Values assigned to options in static administration are not changed by upgrade scripts. These values remain stored in the telephone until either:

- a new boot file is downloaded, or
- the IP telephone is reset, as indicated in Reset System Values on page 48.

Use these option-setting procedures **only** with static addressing and, as always, only if instructed by the system or LAN administrator. Do **not** use these option-setting procedures if you are using DHCP. DHCP is the Dynamic Addressing Process, as indicated in Dynamic Addressing Process on page 24.

Entering Data for Administrative Options

This section applies to all 1600 Series IP Telephones and describes how to enter data for administrative options.

1. Invoke all local procedures by pressing the **Mute** button, up to 7 numeric dial pad buttons, and the **#** button.

   A 6-second timeout is in effect between button presses after pressing the **Mute** button. If you do not press a valid button within 6 seconds of pressing the previous button, the collected digits are discarded. In this case, no administrative option is invoked.

2. Attempts to enter invalid data are rejected, and the telephone emits an error beep.
3. If you enter a numeric digit for a value or for an IP address or subnet mask field after entering only a zero, the new digit replaces the zero.
4. Press the **#** button to go to the next step.
5. To backspace, press the leftmost softkey. When you press the applicable button or key to backspace, the most recently entered digit or period is erased from the display. The cursor remains in the erased character's former position.
6. If **PROCPSWD** is administered as indicated in Chapter 7 of the *Avaya 1600 Series IP Deskphones Administrator Guide*, you must type the **Local Procedure password** after pressing **Mute** and before pressing the code for your given local programming option.

   Note:

   If **PROCSTAT** has been administered to **1**, you will not be able to invoke any administrative options other than **V I E W**.

About Local Administrative Procedures

Local administrative procedures allow you to customize the 1600 Series IP Telephone installation for your specific operating environment. This section provides a description of each local administrative option covered in this guide, with references to the pages on which the option appears.

Note:

Unless otherwise prohibited by administration, the user can view but not change most of the parameters associated with Local Administrative procedures. For more information about this option, see the applicable user guides.

Local Programming Option	Code	See
Set 802.1X operational mode	8 0 2 1 X (8 0 2 1 9)	Set the 802.1X Operational Mode on page 32.
Static addressing	A D D R (2 3 3 7)	Static Addressing Installation on page 35.
Automatic Gain Control	A G C (2 4 2)	Disable/Enable Automatic Gain Control on page 38.
DHCP chaddr field value	C H A D D R (2 4 2 3 3 7)	Manually Setting the DHCP Client Hardware Address on page 40.
Clear values to factory defaults	C L E A R (2 5 3 2 7)	Clear Procedure on page 41.
Enable/disable Debug Mode	D E B U G (3 3 2 8 4)	Disable/Enable Debug Mode on page 42.
Group Identifier	G R O U P (4 7 6 8 7)	Group Identifier on page 43.
Interface Control	I N T (4 6 8)	Interface Control on page 44.
Event Logging	L O G (5 6 4)	Disable/Enable Event Logging on page 46.
Reset the telephone	R E S E T (7 3 7 3 8)	Reset System Values on page 48.
Restart the telephone	R E S E T (7 3 7 3 8)	Restart the Telephone on page 49.
Signaling protocol identifier (not applicable to Release 1.0)	S I G (7 4 4)	Signaling Protocol Identifier on page 50.
Site-Specific Option number	S S O N (7 7 6 6)	Site-Specific Option Number Setting on page 51.
Test the telephone	T E S T (8 3 7 8)	Self-Test Procedure on page 52.
View current parameter values and file names	V I E W (8 4 3 9)	The View Administrative Option on page 68.

Note:

Unless otherwise prohibited using administration, the user can view but not change most of the parameters associated with Local Administrative Procedures. For more information about this option, see the applicable user guide(s).

Set the 802.1X Operational Mode

Use the following procedure to set or change the operational mode.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 8 0 2 1 9 # (Mute 8 0 2 1 x #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   After entry of the command sequence, the following text displays:

   ```
   802.1X=setting
   *=change #=OK
   ```

   where the ***setting*** is the current value of the system value DOT1X (802.1X Supplicant Mode), defined as:

   - Pass-thru mode if setting = 0
   - P-t w/Logoff (pass-thru with Logoff) mode if setting = 1
   - Supplicant mode without pass-thru or p-t w/Logoff if setting = 2

2. Perform one of the following steps:
   - If you want to change the DOT1X mode value, go to Change the DOT1X Mode Value on page 32.
   - If you want to change the DOT1XSTAT mode value go to Change the DOT1XSTAT Mode Value on page 33.

Change the DOT1X Mode Value

Use the following procedure to change the DOT1X mode value.

1. To change the mode value, press *.

   Depending on the current value, the next sequential valid mode value is selected and displayed as the setting. For example, if the current value is pass-thru (0), pressing *

changes the value to 1 (p-t w/Logoff). ("p-t w/Logoff" stands for "pass-thru with Logoff".) If the current value is Supplicant mode (2), pressing * changes the value to 0 (pass-thru).

If a value different from the current 802.1X value is entered, the following text displays left-justified at the top of the display:

```
Save new value?
*=no    #=yes
```

2. Press the * button to terminate the procedure, or the **#** button to save the new value. If you press the **#** button, the telephone displays the following text:

```
New value being saved
```

The telephone saves the new value.

Change the DOT1XSTAT Mode Value

Use the following procedure to change the DOT1XSTAT mode value.

1. Press **#**.

The following text displays:

```
Supplicant=setting
*=change #=OK
```

where the ***setting*** is the current value of the system value DOT1XSTAT (802.1X Supplicant Mode), defined as:

- Disabled if setting = 0
- Unicast only if setting = 1
- Unicast/multicast if setting = 2

2. To change the mode value, press *.

Depending on the current value, the next sequential valid mode value is selected and displayed as the setting. For example, if the current value is Disabled (0), pressing * changes the value to 1 (Unicast only). If the current value is Unicast/multicast mode (2), pressing * changes the value to 0 (Disabled).

If a value different from the current 802.1X value is entered, the following text displays left-justified at the top of the display:

```
Save new value?
*=no    #=yes
```

3. Press the * button to terminate the procedure, or the # button to save the new value. If you press the # button, the telephone displays the following text:

   ```
   New value being saved
   ```

   The telephone saves the new value.

Pre-Installation Checklist for Static Addressing

Before performing static addressing, verify that all the requirements listed in the Verify These Network Requirements section of the Pre-Installation Checklist are met. You do not have to consider item 4. on page 13, as it refers to the DHCP server. In addition, you must have the values for the following parameters. Failure to do so can cause data entry errors that prevent the telephone from working. Such errors can also have a negative impact on your network. Print copies of this checklist for each subnet.

- ❑ **1.** The IP address of the media server.
- ❑ **2.** The transport layer port number of the address of the Management Complex (media server/gatekeeper). Although this can be a value between 0 and 65535, the default value is 1719. **Do not** change this value unless it conflicts with an existing port assignment.
- ❑ **3.** The IP address of the gateway/router.
- ❑ **4.** The IP netmask.
- ❑ **5.** The IP address of the HTTP server.

Static Addressing Installation

The usual way to assign IP addresses to IP telephones is the automatic method described in Dynamic Addressing Process on page 24. There might be times, however, when manual assignment of IP addresses is desired.

CAUTION:

Static addressing is necessary when a DHCP server is unavailable.

Because of the increased opportunities for text entry errors associated with static addressing, we very strongly recommend that a DHCP server be installed and static addressing avoided.

Use the following procedure to invoke manual address information programming.

1. Start manual address programming by performing one of the following steps:

   a. During normal DHCP processing, press the ***** key while "`* to program`" displays during the DHCP process.

   or

   b. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 2 3 3 7 # (Mute A D D R #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   The telephone displays:

   ```
   Phone=nnn.nnn.nnn.nnn
   New=_
   ```

   where ***nnn.nnn.nnn.nnn*** is the current IP address system value of the telephone.

2. Enter the **telephone's IP address** followed by the **#** button.

   The telephone displays:

   ```
   CallSv=nnn.nnn.nnn.nnn
   New=_
   ```

   where ***nnn.nnn.nnn.nnn*** is the current system value of the media server/gatekeeper IP address.

3. Enter the **Call server IP address** followed by the **#** button.

   The telephone displays:

   ```
   Router=nnn.nnn.nnn.nnn
   New=_
   ```

   where ***nnn.nnn.nnn.nnn*** is the current system value of the gateway/router IP address.

4. Enter the **Gateway router IP address** followed by the **#** button.

   The telephone displays:

   ```
   Mask=nnn.nnn.nnn.nnn
   New=_
   ```

   where ***nnn.nnn.nnn.nnn*** is the current system value of the IP netmask.

5. Enter the **IP netmask** followed by the **#** button.

   The telephone displays:

   ```
   FileSv=nnn.nnn.nnn.nnn
   New=_
   ```

   where ***nnn.nnn.nnn.nnn*** is the current system value of the HTTP/HTTPS server IP address.

6. Enter the **File server** followed by the **#** button.

   The telephone displays one of the following texts, depending on the current setting of the system parameter NVL2Q (802.1Q):

   If NVL2Q is 0:

   ```
   802.1Q=auto
   *=change #=OK
   ```

   If NVL2Q is 1:

   ```
   802.1Q=on
   *=change #=OK
   ```

   If NVL2Q is 2:

   ```
   802.1Q=off
   *=change #=OK
   ```

7. Press * to change **802.1Q** to the next sequential value. For example, if the current value is 0 (auto) pressing * changes it to 1 (on) and if the current value is 2 (off), pressing * changes it to 0 (auto).

   The display is updated to show the current status of 802.1Q.

8. Press the **#** button to continue the procedure without changing the displayed status of 802.1Q

   The telephone displays the following text:

   ```
   VLAN ID=dddd
   New=_
   ```

   where ***dddd*** is the current system value of the 802.1 VLAN ID.

9. Enter a valid value between 0 and 4094 for the new value of the 802.1 **VLAN ID**.

   The telephone displays the following message:

   ```
   VLAN test=ddd
   New=_
   ```

   where ***ddd*** is the number of seconds to wait for the **DHCPOFFER** on a non-zero VLAN.

10. Enter a valid value between 0 and 999 for the new value of the **DHCPOFFER** wait period.

    The telephone displays:

    ```
    Save new values?
    *=no #=yes
    ```

11. Press the **#** button to save the new values you entered.

    The telephone displays:

    ```
    New values
    being saved
    ```

    Once the new values are stored, the telephone is reset.

    If a new boot program is downloaded from the HTTP server after you enter static addressing information, you must reenter your static addressing information.

Disable/Enable Automatic Gain Control

Use the following procedure to turn automatic gain control for the handset, headset, and/or the Speaker on or off.

Note:

The user can potentially override the AGC local procedure settings, as described in the telephone user guide. If overridden, the backup file stores the AGC value(s) set by the user and ignores any setting established using this local procedure.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 2 4 2 # (Mute A G C #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

2. After entry of the command sequence, one of the following displays, based on the current value of the system value AGCHAND:

   If AGCHAND = 1:

   ```
   Handset AGC=on
   0=off #=OK
   ```

   If AGCHAND = 0:

   ```
   Handset AGC=off
   1=on #=OK
   ```

3. To change the AGC Handset value from On to Off, press **0**. To change the AGC Handset value from Off to On, press **1**.

   If the telephone has a Headset interface one of the following displays, based on the current value of the system value AGCHEAD:

   If AGCHEAD = 1:

   ```
   Headset AGC=on
   0=off #=OK
   ```

   If AGCHEAD = 0:

   ```
   Headset AGC=off
   1=on #=OK
   ```

   If the telephone does not have a headset interface, proceed to Step 5.

4. To change the AGC Headset value from On to Off, press **0**. To change the AGC Headset value from Off to On, press **1**.

   One of the following displays, based on the current value of the system value AGCSPKR:

   If AGCSPKR = 1:

   ```
   Speaker AGC=on
   0=off #=OK
   ```

   If AGCSPKR = 0:

   ```
   Speaker AGC=off
   1=on #=OK
   ```

5. To change the AGC Speaker value from On to Off, press **0**. To change the AGC Speaker value from Off to On, press **1**.

   If a value different from the current AGCHAND value and/or the current AGCHEAD value and/or the current AGCSPKR value is entered, the following text displays left-justified at the top of the display:

   ```
   Save new value?
   *=no    #=yes
   ```

6. Press the * button to terminate the procedure, or the **#** button to save the new value(s). If you press the **#** button, the telephone displays the following text:

   ```
   New value being saved
   ```

   The telephone saves the new value(s).

Manually Setting the DHCP Client Hardware Address

Use this procedure to manually set or change the Client Hardware Address, if you use static addressing rather than DHCP.

1. While the telephone is on-hook and idle, press the following sequence of keys on the telephone's faceplate:

   Mute 2 4 2 3 3 7 # (Mute C H A D D R #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   The telephone displays the following text left-justified at the top of the display:

   ```
   chaddr=ddd
   New=
   ```

   where ***ddd*** is the value of NVCHADDR, the system variable for the DHCP Client Hardware Address.

2. To change the Client Hardware Address value, enter a valid client hardware address. This value is usually the MAC address, which DHCP then converts to an integer preceded by zeroes.

   For all IP telephones, if a value different from the current value of NVCHADDR is entered, the following text displays left-justified at the top of the display:

   ```
   Save new value?
   *=no    #=yes
   ```

3. Press the * button to terminate the procedure, or the **#** button to save the new value. If you press the **#** button, the telephone displays the following text:

   ```
   New value being saved
   ```

   The telephone saves the new value.

Clear Procedure

Sometimes, you might want to remove *all* administered values, user-specified data, and option settings. Essentially, you want to return a telephone to its initial “clean slate” or out of the box condition. This is usually done when passing a telephone to a new, dedicated user when the user’s **L O G O F F** option is not sufficient. For example, a new user is assigned the same extension, but requires different permissions than the previous user.

The **C L E A R** option erases all administered data—static programming, file server and call server programming, and user settings including Contact button labels and locally programmed Feature button labels, and restores all such data to default values. The **C L E A R** option does not affect the software load itself. If you have upgraded the telephone, the telephone retains the latest software. Once you have cleared a telephone, you can administer it normally.

CAUTION:

This procedure erases all administered data, without any possibility of recovering the data.

Use the following procedure to clear the telephone of its administrative, user-assigned and options values.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 2 5 3 2 7 # (Mute C L E A R #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   The following text displays left-justified at the top of the display:

   ```
   Clear all values?
   *=no        #=yes
   ```

2. If you do not want to clear all values, press * (no) to terminate the procedure and retain the current values.

   A screen displays the following prompt on the top line:

   ```
   Are you sure?
   *=no    #=yes
   ```

3. Press the * button to terminate the procedure without clearing the values. Press the **#** button to clear all values to their initial default values.

   A confirmation tone sounds and the following text displays left-justified at the top of the display:

   ```
   Clearing values.
   ```

   The telephone is cleared to its “out of the box” state.

Disable/Enable Debug Mode

Use the following procedure to turn the debug mode for the button module serial port on or off.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 3 3 2 8 4 # (Mute D E B U G #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

2. After entry of the command sequence, the following displays, based on the current value of the system value NVDEBUG:

   If NVDEBUG = 1:

   ```
   Debug mode=on
   0=off #=OK
   ```

   If NVDEBUG = 0:

   ```
   Debug mode=off
   1=on #=OK
   ```

   If a value different from the current NVDEBUG value is entered, the following text displays left-justified at the top of the display:

   ```
   Save new value?
   *=no    #=yes
   ```

3. Press the * button to terminate the procedure, or the **#** button to save the new value. If you press the **#** button, the telephone displays the following text:

   ```
   New value being saved
   ```

   The telephone saves the new value.

Group Identifier

Use the following procedure to set or change the Group Identifier.

Note:

Perform this procedure only if the LAN Administrator instructs you to do so. For more information about groups, see The GROUP System Value on page 65.

While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

Mute 4 7 6 8 7 (Mute G R O U P)

Note:

Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

The following text displays left-justified at the top of the display:

```
Group=ddd
New=_
```

where ***ddd*** is the Group value.

1. Enter a valid **Group** value (0-999).

   If a value different from the current Group value is entered, the following text displays left-justified at the top of the display:

   ```
   Save new value?
   *=no    #=yes
   ```

2. Press the * button to terminate the procedure, or the **#** button to save the new value.

   If you press the **#** button, the following text displays:

   ```
   New value
   being saved
   ```

   The new value is saved and the user interface is restored to its previous state.

Interface Control

Use the following procedure to set or change the interface control value.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 4 6 8 # (Mute I N T #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

2. After entry of the command sequence, telephones with an internal Ethernet switch display the following text, depending on the current interface control value:

   ```
   PHY1=status
   *=change #=OK
   ```

   where ***status*** is the value of PHY1STAT, defined as:

   - Status is **auto** when PHY1STAT = 1
   - Status is **10Mbps HDX** when PHY1STAT = 2
   - Status is **10Mbps FDX** when PHY1STAT = 3
   - Status is **100Mbps HDX** when PHY1STAT = 4
   - Status is **100Mbps FDX** when PHY1STAT = 5

3. To change the PHY1 value, press *****.

   Depending on the current value, the next sequential valid PHY1 value is selected and displayed as the status. For example, if the current value is 10Mbps HDX (2), pressing ***** changes the value to 3 (10Mbps FDX).

4. Press the * button to terminate the procedure, or the # button to save the new value. If you press the **#** button, the following text displays:

```
PHY2=status
*=change #=OK
```

   where ***status*** is the value of PHY2STAT, defined as:

   - Status is **disabled** when PHY2STAT = 0
   - Status is **auto** when PHY2STAT = 1
   - Status is **10Mbps HDX** when PHY2STAT = 2
   - Status is **10Mbps FDX** when PHY2STAT = 3
   - Status is **100Mbps HDX** when PHY2STAT = 4
   - Status is **100Mbps FDX** when PHY2STAT = 5

5. To change the PHY2 value, press *****.

   Depending on the current value, the next sequential valid PHY2 value is selected and displayed as the status. For example, if the current value is 10Mbps HDX (2), pressing ***** changes the value to 3 (10Mbps FDX).

   The following text displays left-justified at the top of the display:

```
Save new value?
*=no      #=yes
```

6. Press the * button to terminate the procedure, or the **#** button to save the new values. If you press the **#** button, the following text displays.

```
New value
being saved
```

   The new values are saved and a restart occurs automatically. The user interface is restored to its previous state.

Disable/Enable Event Logging

Use the following procedure to enable or disable logging of system events.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 5 6 4 # (Mute L O G #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

2. After entry of the command sequence, the telephone displays the following text, depending on the current value of the system parameter NVLOGSTAT:

   ```
   Log=status
   *=change #=OK
   ```

   where ***status*** is the type of logging indicated by the NVLOGSTAT value, defined as:

   - Status is **disabled** when NVLOGSTAT = 0
   - Status is **emergencies** when NVLOGSTAT = 1
   - Status is **alerts** when NVLOGSTAT = 2
   - Status is **critical** when NVLOGSTAT = 3
   - Status is **errors** when NVLOGSTAT = 4
   - Status is **warnings** when NVLOGSTAT = 5
   - Status is **notices** when NVLOGSTAT = 6
   - Status is **information** when NVLOGSTAT = 7
   - Status is **debug** when NVLOGSTAT = 8

3. To change the logging status, press *****.

   Depending on the current value, the next sequential valid NVLOGSTAT value is selected and displayed as the status. For example, if the current value is alerts (2), pressing ***** changes the value to 3 (critical). If the current value is debug (8), pressing ***** changes the value to 0 (disabled).

   If a value different from the current NVLOGSTAT value is entered, the following text displays left-justified at the top of the display:

   ```
   Save new value?
   *=no    #=yes
   ```

4. Press the * button to terminate the procedure, or the # button to save the new value. If you press the # button, the telephone displays the following text:

```
New value being saved
```

The telephone saves the new value.

Logoff

Use the following procedure to log off a telephone.

CAUTION:

Once a telephone is logged off, a password and extension might be needed to log back on.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

Mute 5 6 4 6 3 3 # (Mute L O G O F F #)

Note:

Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

2. After entry of the command sequence, the telephone unregisters from the call server. The telephone display (and button module display, if applicable) clears, then displays the following prompt for subsequent login:

```
Enter Extension
EXT= #=OK
```

Reset System Values

Use the following procedure to reset all system values and system initialization values except AUTH and NVAUTH to the default values. It also resets the 802.1X identity and password to the default values.

CAUTION:

This procedure erases all static information except the extension number and password, without any possibility of recovering the data.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 7 3 7 3 8 # (Mute R E S E T #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   The IP telephones display the following text left-justified at the top of the display:

   ```
   Reset values?
   *=no    #=yes
   ```

   CAUTION:

   As soon as you press the **#** button, all static information except the extension number and password will be erased, without any possibility of recovering the data.

2. If you do not want to reset the system values, press * (no) and proceed to Step 4.

   The following prompt displays on the top line:

   ```
   Are you sure?
   *=no    #=yes
   ```

3. Press the * button to continue without resetting the values and proceed to Step 4. Or, press the **#** button to reset values to their defaults.

   All telephones display the following text left-justified at the top of the display while the system values are reset to defaults:

   ```
   Resetting
   values.
   ```

   The telephone resets from the beginning of registration, which takes a few minutes.

4. If you do not reset the telephone, the telephone displays the following prompt:

```
Restart phone?
*=no    #=yes
```

5. Press the * key to terminate the procedure without restarting the telephone. Otherwise, press **#** and perform the following Restart procedure.

Restart the Telephone

Use the following procedure to restart the telephone.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 7 3 7 3 8 # (Mute R E S E T #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   The IP telephones display the following text left-justified at the top of the display:

```
Reset values?
*=no    #=yes
```

2. Press the **#** button to reset values to their defaults, or ***** to continue a restart without resetting the values to their defaults.

   The telephones display the following text left-justified at the top of the display while the system values are reset to defaults:

```
Resetting
values.
```

   Once you press the * button to restart without resetting the values, the following prompt displays on all IP telephones:

```
Restart phone?
*=no    #=yes
```

3. Press the * key to terminate the procedure without restarting the telephone.

   Press the **#** key to restart the telephone.

   The remainder of the procedure depends on the status of the boot and application files. See Appendix A: Restart Scenarios.

Signaling Protocol Identifier

Note:

This procedure is provided for future use only, and is not currently applicable to Release 1.0.

Use the following procedure to set or change the Signaling Protocol Identifier. A valid SIG Protocol Identifier is either **0** (default), **1** (H.323), or **2** (SIP).

Note:

Perform this procedure only if the LAN Administrator instructs you to do so.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 7 4 4 (Mute S I G)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   The telephone displays the following text left-justified at the top of the display:

   ```
   SIG=protocol
   *=change #=OK
   ```

   where ***protocol*** is the telephone's signaling protocol (H.323, SIP, or default) corresponding to the numeric identifier (1, 2, or 0).

2. To change the SIG value, press *****.

   Depending on the current value, the next sequential valid SIG value is selected and displayed as the protocol. I.e., if the current value is SIP (2), pressing ***** changes the value to 0 (default). If the current value is H.323 (1), pressing ***** changes the value to 2 (SIP).

   If a value different from the current Group value is entered, the telephone displays the following text left-justified at the top of the display:

   ```
   Save new value?
   *=no    #=yes
   ```

3. Press the ***** button to terminate the procedure, or the **#** button to save the new value. If you press the **#** button, the telephone displays the following text:

   ```
   New value
   being saved
   ```

   The new value is saved. All telephones display the following text left-justified at the top of the display:

   ```
   Restart phone?
   *=no    #=yes
   ```

4. Press the * (asterisk) key to terminate the procedure without restarting the telephone.

   Press the **#** (pound) key to restart the telephone.

   The remainder of this procedure depends on the status of the boot and application files. See Appendix A: Restart Scenarios.

Site-Specific Option Number Setting

CAUTION:

Do **not** perform this procedure if you are using static addressing. Perform this procedure **only** if you are using DHCP **and** the LAN administrator instructs you to do this.

Use the following procedure to set the Site-Specific Option Number (SSON).

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 7 7 6 6 # (Mute S S O N #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   The telephone displays the following text left-justified at the top of the display:

   ```
   SSON=ddd
   New=_
   ```

   where ***ddd*** is the value of SSON.

2. Enter a valid value between 128 and 254 for the **SSON**.

   For all IP telephones, if a value different from the current SSON value is entered, the following text displays left-justified at the top of the display:

   ```
   Save new value?
   *=no    #=yes
   ```

3. Press the * button to terminate the procedure, or the **#** button to save the new value. If you press the **#** button, the telephone displays the following text:

   ```
   New value
   being saved
   ```

   The telephone saves the new value, and restores the user interface to its previous state.

Self-Test Procedure

Note:

1600 Series IP Telephones store two software code images in reprogrammable non-volatile memory. The primary image, called the “big app” must be running to perform a self-test. The backup image, called the “little app” does not support the self-test.

For self-testing, use the following procedure:

1. To invoke 1600 Series IP Telephone self-test procedures, press the following sequence of keys on the faceplate of the telephone:

   Mute 8 3 7 8 # (Mute T E S T #)

   Note:

   Press the **Mute** button momentarily. Do not press this button while pressing other keys/buttons.

   All telephones show the following text, left-justified at the top of the display, for 1 second after self-test is invoked:

   ```
   Self test
   #=end
   ```

   A block character with all pixels on then displays in all display character locations for 5 seconds. Display of the block character helps to find bad display pixels.

   The telephone displays one of the following:

   If self-test passes:

   ```
   Self test passed
   #=end
   ```

   If self-test fails:

   ```
   Self test failed
   #=end
   ```

2. To terminate the self-test, press the **#** button on the dial pad at any time. Doing so generates a confirmation tone, and returns the user interface to its previous state.

Variable parameters for improving audio quality

Set the following parameters to improve the audio quality of the 46xx phones (4610/20/21/22/25) using the script file variable.

The system downloads these variable names and their values from the script file at initialization, and then decodes and stores the variable names and their values in internal RAM memory (volatile memory) for use by the audio software.

Table 1: Variable parameters for improving audio quality

Parameter Name	Default Value	Status	Description and Value Range
AUDIOENV: The value associated with this script file variable (range of 0 to 299) controls the following four audio flags. The AUDIOENV value serves as an index into a table where the system extracts the flags for the four parameters. Each flag allows the audio code to set a PhonexChange register to a specific value to accomplish the required audio performance characteristic. If you set the AUDIONEV values outside the valid range or set non-numeric values, the system ignores these values and retains the default values for these parameters.			
AGC_Dyn_Range	0 for +/-9dB 1 for +/-12 dB 2 for +/-15 dB 3 for +/-18 dB		0 for +/-9dB This is the default setting (typical office environment). The system uses this setting if you do not specify any values or set any values in the script file.

Parameter Name	Default Value	Status	Description and Value Range
NR_thresh_Hd	0 (6dB noise reduction) for a typical office environment 1 (15dB noise reduction) for call center applications 2 (24dB noise reduction) for “other” audio environments 3 (0 dB noise reduction) for disabling the noise reduction algorithm altogether 4 (48dB noise reduction)		The transmit noise reduction threshold for the headset. These thresholds correspond to the maximum amount of noise reduction that is applied in the transmit path.

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Parameter Name	Default Value	Status	Description and Value Range
NR_thresh_Hs	0 (6dB noise reduction) for a typical office environment 1 (15dB noise reduction) for call center applications 2 (24dB noise reduction) for “other” audio environments 3 (0 dB noise reduction) for disabling the noise reduction algorithm altogether 4 (48dB noise reduction)		The transmit noise reduction threshold for the handset. The values are same as the headset noise reduction threshold.
Hd_Tx_Gain	0 for normal transmit gain 1 for +6dB 2 for -6dB		The transmit noise gain threshold for the headset.

Parameter Name	Default Value	Status	Description and Value Range
EXP_slope_Hd	0 for a typical office environment 1 for call center applications 2 for other audio environments 3 for disabling the noise reduction algorithm altogether		The expander threshold for the headset. These thresholds correspond to the maximum amount of expansion that is applied in the transmit path. These numbers define the slope of the expander curve. **Note:** When Noise Reduction is enabled, you can use the same values from NR_thresh_Hd in EXP_slope_Hd.They have analogous meanings. For example, the NR numbers refer to noise reduction thresholds while the EXP numbers refer to the slope of the expander curve. NR_thresh_Hd=3 means that there is no Noise Reduction and EXP_slope_Hd means that the slope is linear (Expander is off).

Parameter Name	Default Value	Status	Description and Value Range
EXP_slope_Hs	0 for a typical office environment 1 for call center applications 2 for other audio environments 3 for disabling the noise reduction algorithm altogether		The expander threshold for the handset. The values are same as the expander threshold for the headset.

Parameter Name	Default Value	Status	Description and Value Range
AUDIOSTHD: The value associated with this script file variable controls the side tone for the headset.			
AUDIOSTHD	0 for default setting 1 for 3 steps below default 2 for infinite loss or no sidetone 3 for one step below default 4 for 2 steps below default 5 for 4 steps below default 6 for 5 steps below default 7 for 6 steps below default 8 for 1 step above default 9 for 2 steps above default		The system ignores values other the ones specified and retains the default values for Sidetone_Gain_Hd.

Parameter Name	Default Value	Status	Description and Value Range
AUDIOSTHS: The value associated with this script file variable controls the side tone for the handset.			
AUDIOSTHS	0 for default setting 1 for 3 steps below default 2 for infinite loss or no sidetone 3 for one step below default 4 for 2 steps below default 5 for 4 steps below default 6 for 5 steps below default 7 for 6 steps below default 8 for 1 step above default 9 for 2 steps above default.		The system ignores values other the ones specified and retains the default values for Sidetone_Gain_Hs.

Parameter Name	Default Value	Status	Description and Value Range
EXPANENHS			If this system variable is 1, then the system changes the default noise-reduction algorithm operating in the transmit path, and uses an actual expander algorithm. If the value is 0 or not specified, then the system takes the normal noise-reduction algorithms.
EXPANENHD			If this system variable is 1, then the system changes the default noise-reduction algorithm operating in the transmit path changes, and uses an actual expander algorithm. If the value is 0 or not specified, then the system takes the normal noise-reduction algorithms.

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An example of the format for setting the script file variables is as follows:

SET AUDIOENV 14

SET AUDIOSTHD 1

SET AUDIOSTHS 2

Chapter 4: Maintaining 1600 Series IP Telephones

Introduction

This chapter covers the maintaining the 1600 Series IP Telephones, for example, downloading a new telephone software version from the Avaya support Web site. Note that the recommended configuration is the latest call server software and the latest IP telephone firmware.

Downloading Software Upgrades

The software releases containing the files needed to operate the 1600 Series IP Telephones are bundled together in a self-extracting executable file you download to your file server from the Avaya support Web site at: http://www.avaya.com/support. The self-extracting executable file comes in both zipped and unzipped format.

Currently, you have one “bundle” to download. That bundle contains:

- An upgrade script file and a settings file, which allow you to upgrade to new software releases and new functionality without having to replace IP telephones.
- Application files for all current 1600 Series IP Telephones.
- Other useful information such as a ReadMe file and a settings file template to customize parameters and settings.

Download File Content

Two configuration files on the file server are important to understand. Other files are needed when the Avaya IP Telephones need an upgrade. The important files are:

- An upgrade script file, which tells the IP telephone whether the telephone needs to upgrade software. The Avaya IP Telephones attempt to read this file whenever they reset. The upgrade script file is also used to point to the settings file.
- The settings file contains the option settings that enable, disable, or otherwise customize the settings you might need to tailor the Avaya IP Telephones for your enterprise.

Note:

You can use one settings file for all your Avaya IP Telephones including the 1600 Series IP Telephone, 9600 Series IP Telephones, and 4600 Series IP Telephones.

In addition to the upgrade script and settings files, you need the latest binary code used in the Avaya IP Telephones.

Download Procedure

The Avaya-provided upgrade script files and the binaries included in the zip files upgrade the Avaya IP Telephones. You should not need to modify them. It is essential that all the binary files be together on the file server. When downloading a new release onto a file server with an existing release already on it, we recommend that you:

- Stop the file server.
- Back up all the current file server directories as applicable.
- Copy your ***46xxsettings.txt*** file to a backup location.
- Remove all the files in the download directory. This ensures that you do not have an inappropriate binary or configuration file on the server. The only system values that can be used in the Conditional statement are: BOOTNAME, GROUP, and SIG.
- Download the self-extracting executable file, or the corresponding zip file.
- Extract all the files.
- Copy your ***46xxsettings.txt*** file back into the download directory.
- Check the Readme files for release-specific information.
- Modify the ***46xxsettings.txt*** file as desired.
- Restart the HTTP/HTTPS server.
- Reset your Avaya IP Telephones.

You can download a default upgrade script file, sometimes called merely the “script file,” from http://www.avaya.com/support. This file allows the telephone to use default settings for customer-definable options. Of course, these settings can also be changed with DHCP or in some cases, from the telephone’s dialpad itself. However, you might want to open the default file and administer the options to add useful functionality to your Avaya IP Telephones. This file must reside in the same directory as the upgrade script file, and must be called ***46xxsettings.scr*** or ***46xxsettings.txt***. The Avaya IP Telephones can operate without this file.

Note:

Most Windows systems interpret the file extension ***.scr** as a screen saver. The 4600 IP Telephones originally used *.scr to indicate a script file. We highly recommend that the settings file have the extension ***.txt**.

The settings file can include any of the five types of statements, one per line:

- Comments, which are statements with a "**#**" character in the first column.
- Tags, which are comments that have exactly one space character after the initial **#**, followed by a text string with no spaces.
- **Goto** commands, of the form **GOTO *tag.*** **Goto** commands cause the telephone to continue interpreting the settings file at the next line after a **# *tag*** statement. If no such statement exists, the rest of the settings file is ignored.
- Conditionals, of the form **IF *$name* SEQ *string* GOTO *tag***. Conditionals cause the **Goto** command to be processed if the value of ***name*** is a case-insensitive equivalent to ***string***. If no such ***name*** exists, the entire conditional is ignored.
- **SET** commands, of the form **SET *parameter_name value***. Invalid values cause the specified value to be ignored for the associated ***parameter_name*** so the default or previously administered value is retained. All values must be text strings, even if the value itself is numeric, a dotted decimal IP address, etc.

Note:

Enclose all data in quotation marks for proper interpretation.

The Avaya-provided upgrade script file includes lines that tell the telephone to **GET *46xxsettings.scr*** and ***46xxsettings.txt***. These lines cause the telephone to use HTTP/HTTPS to attempt to download the file specified in the **GET** command. If the file is obtained, its contents are interpreted as an additional script file. That is how your settings are changed from the default settings. If the file cannot be obtained, the telephone continues processing the upgrade script file. The upgrade script file is processed so that if there is no 46xxsettings.scr file, the telephone looks for a 46xxsettings.txt file. If the settings file is successfully obtained but does not include any setting changes the telephone stops using HTTP. This happens when you initially download the script file template from the Avaya support Web site, before you make any changes. When the settings file contains no setting changes, the telephone does not go back to the upgrade script file.

You can change the settings file name, if desired, as long as you also edit the corresponding **GET** command in the upgrade script file. However, we encourage you **not** to alter the Avaya-provided upgrade script file. If Avaya changes the upgrade script file in the future, any changes you have made will be lost. We strongly encourage you to use the ***46xxsettings*** file to customize your settings instead.

For more details on customizing your settings file, see Contents of the Settings File on page 64.

Contents of the Settings File

After checking the application software, the 1600 Series IP Telephone looks for a 46xxsettings file. This optional file is under your control and is where you can identify non-default option settings, application-specific parameters, etc. You can download a template for this file from the Avaya support Web site. An example of what the file could look like follows.

Note:

The following is intended only as a simple example. Your settings will vary from the settings shown. This sample assumes specification of a DNS Server, turning off enhanced local dialing, and a Web Browser.

SET DNSSRVR dnsexample.yourco.com

SET ENDIALSTAT 0

SET WMLHOME http://yourco.com/home.wml

SET WMLPROXY 11.11.11.11

See Chapter 7 in the *Avaya 1600 Series IP Deskphones Administrator Guide* for details about specific values. You need only specify settings that vary from defaults, although specifying defaults is harmless.

Downloading Language Files

Language files must be stored in the same location as the 46xxsettings file or under the HTTP Server directory, defined using the **SET HTTPDIR_*HTTP server directory path*** command.

You can download a new language file version only if the filename differs from the language file previously downloaded. Alternately, you can remove the old language file using an empty **SET LANGxFILE** command in the 46xxsettings file before downloading a language file with the same filename.

Downloading Font Files for 1600 Series International Telephones

The font file must be stored in the same location as the 46xxsettings file or under the HTTP Server directory, defined using the **SET HTTPDIR_*HTTP server directory path*** command.

You can download a new font tile version only if the filename differs from the font file previously downloaded. Alternately, you can remove the old font file using an empty **SET FONTFILE** command in the 46xxsettings file before downloading a font file with the same filename.

The GROUP System Value

You might have different communities of end users, all of which have the same model telephone, but which require different administered settings. For example, you might want to restrict Call Center agents from being able to Logoff, which might be an essential capability for “hot-desking” associates. We provide examples of the group settings for each of these situations later in this section.

The simplest way to separate groups of users is to associate each of them with a number. Use the GROUP system value for this purpose. The GROUP system value **cannot** be set in the 46xxsettings file. The GROUP system value can only be set on a telephone-by-telephone basis. To do so, first identify which telephones are associated with which group, and designate a number for each group. The number can be any integer from 0 to 999, with 0 as the default, meaning your largest group would be assigned as Group 0.

Then, at each non-default telephone, instruct the installer or end-user to invoke the GROUP Local (dialpad) Administrative procedure as specified in Chapter 3: Local Administrative Options and specify which GROUP number to use. Once the GROUP assignments are in place, edit the configuration file to allow each telephone of the appropriate group to download its proper settings.

Here is an illustration of a possible settings file for the example of a Call Center with hot-desking associates at the same location:

```
IF $GROUP SEQ 1 goto CALLCENTER
IF $GROUP SEQ 2 goto HOTDESK
{specify settings unique to Group 0}
goto END

# CALLCENTER
{specify settings unique to Group 1}
goto END

# HOTDESK
{specify settings unique to Group 2}

# END
{specify settings common to all Groups}
```

Chapter 5: Troubleshooting Guidelines

Introduction

This chapter describes problems that might occur during both installation and normal operation of the 1600 Series IP Telephone and possible ways of resolving these problems.

This chapter contains the following sections:

- Descriptions of error conditions and methods for resolving them.
- The use of the **V I E W** option to view system values.
- Error and status messages, and methods for resolving them.

Error Conditions

There are three areas where installers can troubleshoot problems before seeking assistance from the system or LAN administrator:

1. Check both the power and Ethernet wiring for the following conditions:
   - Whether all components are plugged in correctly.
   - Check LAN connectivity in both directions to all servers - DHCP, HTTP, HTTPS, Avaya Aura Communication Manager or Avaya Aura Communication Manager Branch.
   - If the telephone is supposed to be powered from the LAN, ensure that the LAN is properly administered and is compliant with IEEE 803.3af.
2. If you are using static addressing:
   - Use the **`View`** command to find the names of the files being used and verify that these filenames match those on the HTTP/HTTPS server. See The View Administrative Option on page 68 for more information. Check the Avaya Web site to verify whether the correct files are being used.
   - Use the **ADDR** option to verify IP addresses. See Static Addressing Installation on page 35 for information.
3. If the 1600 Series IP Telephone is not communicating with the system (DHCP, HTTP, or Avaya Media Server), make a note of the last message displayed, as described in Table 3 and/or Table 4. Consult the system administrator.
4. If you expect the telephone to be IEEE-powered, verify with the LAN administrator that IEEE power is indeed supported on the LAN.

DTMF Tones

H.323 telephones do not send DTMF tones to non-H.323 telephones. The failure to hear DTMF tones sent by a far-end 1600 Series IP Telephone does not require any action on the user's part. The TN2302AP board does not pass in-band DTMF tones.

Power Interruption

If power to a 1600 Series IP Telephone is interrupted while the telephone is saving the application file, the HTTP/HTTPS application can stop responding. If this occurs, restart the HTTP/HTTPS server.

The View Administrative Option

If you are using static addressing and encounter problems, use the following procedure to verify the current values of system parameters and file versions.

Note:

Unless otherwise prevented using administration, the user can view but not change most of the parameters associated with Local Administrative Procedures. For more information about this option, see the applicable user guide(s).

Note:

If the View Network Information option is not available due to being disabled by administration, use the **ADDR** option to view IP addresses. See Static Addressing Installation in Chapter 3: Local Administrative Options. The IP addresses might have been entered incorrectly. Verify whether you were provided with correct IP addresses.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 8 4 3 9 # (Mute V I E W #)

   Note:

   Press the **Mute** button momentarily. Do not press this key while pressing other keys.

   The following text displays left-justified at the top of the display:

```
View settings
*=next   #=exit
```

2. Press the * button at any time during viewing to display the next name and system value pair or filename from Table 2. The first pair returns after the last pair displays. Values that cannot display on one line wrap to the next line.

   Press the # button at any time during viewing to terminate the procedure and restore the user interface to its previous state. The names and values display in the following order:

Table 2: Parameter Values

Name	System Value	Format
Model	***16ccDccc***	Up to 8 ASCII characters: MODEL value.
Phone SN	***cccccccccccccccc***	Telephone Serial Number, up to 18 ASCII characters.
PWB SN	***cccccccccccccccc***	Printed Wiring Board (circuit board) Serial Number, up to 18 ASCII characters. Applies only to 16xx IP Telephones that have a software-readable PWB serial number and comcode.
PWB comcode	***nnnnnnnnn***	9 ASCII numeric characters. Applies only to 16xx IP Telephones that have a software-readable PWB serial number and comcode.
MAC address	***hh:hh:hh:hh:hh:hh***	Each octet of the MAC address displays as a pair of hexadecimal numbers.
L2 tagging	***ccccccccc***	Up to 9 ASCII characters: “on” if NVL2Q = 1 “off” if NVL2Q = 2 “auto: on” if NVL2Q = 0 and 802.1Q tagging is on “auto: off” if NVL2Q = 0 and 802.1Q tagging is off
VLAN ID	***cccc***	Up to 4 ASCII characters. Value is L2QVLAN if 802.1Q tagging is on or “none” of 802.1Q tagging is off.
IP address	***nnn.nnn.nnn.nnn***	Up to 15 ASCII characters: IPADD value.
Subnet mask	***nnn.nnn.nnn.nnn***	Up to 15 ASCII characters: NETMASK value.
Router	***nnn.nnn.nnn.nnn***	Up to 15 ASCII characters: the IP address of the router in use.

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Table 2: Parameter Values (continued)

Name	System Value	Format
File server	***nnn.nnn.nnn.nnn.nnnnn***	Up to 21 ASCII characters: IP address and port of last file server used successfully during initialization or “0.0.0.0” if no file server was used successfully.
Call server	***nnn.nnn.nnn.nnn.nnnnn***	Up to 21 ASCII characters: IP address and port of the call server currently in use, otherwise “0.0.0.0.”
802.1X	If DOT1X = 0 If DOT1X = 1 If DOT1X = 2	pass-thru mode. p-t w/Logoff (pass-thru with Logoff). Supplicant mode.
Group	***nnn***	Up to 3 ASCII numeric characters: GROUP value.
Protocol:	***cccccccc***	Up to 8 ASCII characters, currently only “H.323.”
	filename.ext	4 to 32 ASCII characters. The name of the primary ("big app") image file currently stored in the telephone (endptAPPINUSE).
	cccccccc **Ethern*****et***	2 to 7 ASCII characters, either “100Mbps”, “10Mbps”, or “No” depending on the current speed of the Ethernet line interface.
	bootcodename	1 to 32 ASCII characters. The name of the backup ("little app") image file currently stored in the telephone (endptBOOTNAME).
Button Module 1	***ccccccccccccc***	Up to 14 ASCII characters. The version identifier of the software in the Button Module, if applicable.
Button Module 2	***ccccccccccccc***	Up to 14 ASCII characters. The version identifier of the software in the Button Module, if applicable.
Button Module 3	***ccccccccccccc***	Up to 14 ASCII characters. The version identifier of the software in the Button Module, if applicable.

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Installation Error and Status Messages

The 1600 Series IP Telephones issue messages in English only. The IP telephones also display messages from the switch, which can issue messages in the local language outside the United States. The 1600 Series IP Telephones issue messages in the currently selected language, or if the telephone is logged off, in the language specified by the LANGSYS parameter value. If English is not the selected language, the telephone displays messages in English only when they are associated with local procedures, for example, MUTE V I E W.

Most of the messages in Table 3 display only for about 30 seconds, and then the telephone resets. The most common exception is `Extension in Use`, which requires manual intervention.

Table 3: Possible Error and Status Messages During Installation of 1600 Series IP Telephones

Message	Cause/Resolution
`802.1X Failure`	**CAUSE:** Incorrect credentials provided for authentication or not provided at all. **RESOLUTION:** Follow the display prompts and reenter the 802.1X ID and password.
`Address Conflict`	**CAUSE:** The telephone has detected an IP address conflict. **RESOLUTION:** Verify administration to identify duplicate IP address(es).
`Bad FileSv Address`	**CAUSE:** The HTTP/HTTPS server IP address in the IP telephone's memory is all zeroes. **RESOLUTION:** Depending on the specific requirements of your network, this may not be an error. If appropriate, either administer the DHCP server with the proper address of the HTTP/HTTPS server, or administer the telephone locally using the ADDR option. The ADDR option is explained in Chapter 3: Local Administrative Options.
`Bad Router?`	**CAUSE:** The telephone cannot find a router based on the information in the DHCP file for GIPADD. **RESOLUTION:** Use static addressing to specify a router address, or change administration on DHCP, as indicated in the *1600 Series IP Telephone Administrator Guide*.
`Call Error`	**CAUSE:** The user was on a call when the connection to the gatekeeper went down, perhaps due to a network outage or a gatekeeper problem. The telephone attempted to automatically register with the same, or another, gatekeeper, but the responding gatekeeper had no record of the call. **RESOLUTION:** Wait for the call to end, and if the telephone does not automatically register, restart the telephone.
`Contacting call server...`	**CAUSE:** The telephone has rebooted successfully and is moving on to attempt to register with the call server. **RESOLUTION:** Allow the telephone to continue.

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Table 3: Possible Error and Status Messages During Installation of 1600 Series IP Telephones (continued)

Message	Cause/Resolution
`DHCP: CONFLICT * to program`	**CAUSE:** At least one of the IP address offered by the DHCP server conflicts with another address. **RESOLUTION:** Review DHCP server administration to identify duplicate IP address(es).
`Discover` *aaa.bbb.ccc.ddd*	**CAUSE:** The telephone is attempting to find a call server, and the user is allowed to view IP addresses. **RESOLUTION:** If this message appears for more than a few seconds, verify with the LAN Administrator that a DHCP server is appropriately administered on the network. If there is not supposed to be a DHCP server, you must “break into” the Discovering process and use static addressing. See Static Addressing Installation on page 35. To break into the Discovering process, press the **#** button, and when you see the “100Mbs” or “10Mbs” message, quickly press the ***** (asterisk) button.
`Discovering...`	**CAUSE:** The 16xx telephone is attempting to find a call server and the user is *not* allowed to view IP addresses. **RESOLUTION:** If this message appears for more than a few seconds, verify with the LAN Administrator that a DHCP server is appropriately administered on the network. If there is not supposed to be a DHCP server, you must “break into” the Discovering process and use static addressing. See Static Addressing Installation on page 35. To break into the Discovering process, press the **#** button, and when you see the "1000Mbps", “100Mbps” or “10Mbps” message, quickly press the ***** (asterisk) button.
`EEPROM error, repair required`	**CAUSE:** Downloaded application file was not downloaded or saved correctly. **RESOLUTION:** The telephone automatically resets and attempts to re-initialize.
`Emergency Option`	**CAUSE:** Incompatible emergency option. **RESOLUTION:** This should never happen. Contact Avaya.
`Extension Error`	**CAUSE:** The call server does not recognize the extension entered. **RESOLUTION:** Confirm the extension is correct and is correctly administered on the switch. Then try registration again, taking particular care to enter the extension accurately.
`Extension in Use`	**CAUSE:** The call server detects an extension conflict with an existing set or Softphone. **RESOLUTION:** You can force the current telephone to register, and thereby disconnect the other user, by pressing **#**. The 1600 Series IP Telephone prompts you again for the extension and password. If you enter the same extension and password, you are asked to confirm that you want to unregister the original user. Press **#** to unregister the original user and to register the current telephone. Then press ***** to reset the telephone and enter a different extension and password.
`Finding router...`	**CAUSE:** The telephone is proceeding through boot-up. **RESOLUTION:** Allow the telephone to continue.

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Table 3: Possible Error and Status Messages During Installation of 1600 Series IP Telephones (continued)

Message	Cause/Resolution
Gatekeeper Error	**CAUSE:** The gatekeeper rejects the registration attempt for an unspecified reason. **RESOLUTION:** Review gatekeeper/call server administrations, including IP network parameters.
Gateway Error	**CAUSE:** DEFINITY Release 8.4 does not have an H.323 station extension for this telephone. **RESOLUTION:** On the station administration screen, ensure the DCP set being aliased for this IP telephone has an H.323 station extension administered, in accordance with switch administration instructions. Since the 1600 Series IP Telephones are not supported on DEFINITY Release 8.4, you must upgrade to a release that does support these telephones.
Incompatible	**CAUSE:** This release of the call server does not support the current version of the IP telephone. **RESOLUTION:** Upgrade to the current version of Avaya Aura Communication Manager (3.1 or later) software.
Invalid file	**CAUSE:** The telephone does not have sufficient room to store the downloaded file. **RESOLUTION:** Verify the proper filename is administered in the script file, and that the proper application file is located in the appropriate location on the HTTP/HTTPS server.
IP Address Error	**CAUSE:** The gatekeeper reports an invalid IP address. **RESOLUTION:** This should never happen. Contact Avaya.
License Error	**CAUSE:** The call server does not support IP telephony. **RESOLUTION:** Contact Avaya to upgrade your license.
Limit Error	**CAUSE:** The call server has reached its limit of IP stations. **RESOLUTION:** Unregister telephones not in use, or contact Avaya to upgrade your license.
NAPT Error	**CAUSE:** A device between the telephone and the call server is invoking Network Address Port Translation, which the 1600 Series IP Telephones do not support. **RESOLUTION:** Contact the System Administrator to remove or re-administer the device.
Network connectivity has been lost. Trying to re-establish...	**CAUSE:** The telephone has detected a loss of signal on the Ethernet interface lasting longer than about one second. **RESOLUTION:** Check power and cabling.
No Ethernet	**CAUSE:** When first plugged in, the IP telephone is unable to communicate with the Ethernet. **RESOLUTION:** Verify the connection to the Ethernet jack, verify the jack is Category 5, verify power is applied on the LAN to that jack, etc.

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Table 3: Possible Error and Status Messages During Installation of 1600 Series IP Telephones (continued)

Message	Cause/Resolution
`Packet Error`	**CAUSE:** Protocol timeout error. **RESOLUTION:** Reenter the correct extension and password. If the condition persists, contact the System Administrator.
`Password Error`	**CAUSE:** The call server does not recognize the password entered. **RESOLUTION:** Confirm the password is correct, then try registration again, taking particular care to enter the password accurately.
`Request Error`	**CAUSE:** The gatekeeper believes the telephone's registration request is improperly formatted. **RESOLUTION:** The telephone will automatically attempt to register with the next gatekeeper on its list. If the problem persists, reboot the telephone.
`Restarting...`	**CAUSE:** The telephone is in the initial stage of rebooting. **RESOLUTION:** Allow the telephone to continue.
`Subnet conflict`	**CAUSE:** The telephone is not on the same VLAN subnet as the router. **RESOLUTION:** Administer an IP address on the telephone using Static Addressing Installation, or administer network equipment to administer the telephone appropriately.
`System busy`	**CAUSE:** Most likely, the number of IP endpoints on the call server is already at maximum, Less likely, network resource is unavailable. **RESOLUTION:** The telephone was attempting to access a network resource (DHCP server, HTTP server, or the call server) and was not successful. Check the resource being called upon for its availability. If the resource appears operational and properly linked to the network, verify that addressing is accurate and that a communication path exists in both directions between the telephone and the resource.
`System Error`	**CAUSE:** The call server has an unspecified problem. **RESOLUTION:** Consult your Avaya Media Server administration and troubleshooting documentation.
`Undefined Error`	**CAUSE:** The call server has rejected registration for an unspecified reason. **RESOLUTION:** Consult your Avaya Media Server administration and troubleshooting documentation.
`Updating: DO NOT UNPLUG THE TELEPHONE`	**CAUSE:** The telephone is updating its software image. **RESOLUTION:** Allow the telephone to continue.
`Wrong Set Type`	**CAUSE:** The call server does not recognize the set type. **RESOLUTION:** Ensure the call server is properly administered to expect the appropriate telephone for the IP address and extension.

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Operational Errors and Status Messages

Table 4 identifies some of the possible operational problems that might be encountered after successful 1600 Series IP Telephone installation. The user guide for a specific telephone model also contains troubleshooting for users having problems with specific IP telephone applications. Most of the problems reported by 1600 Series IP Telephone users are not likely to be problems with the telephone itself. Problems are more likely LAN-based, where Quality of Service, server administration, and other issues can impact end-user perception of IP telephone performance.

Table 4: Operational Error Conditions for 1600 Series IP Telephones

Condition		Cause/Resolution
The telephone continually reboots, or reboots continuously about every 15 minutes.		**CAUSE:** The telephone cannot find the call server. **RESOLUTION:** Ensure that MCIPADD is administered either manually or through DHCP or HTTP, as appropriate. **CAUSE:** This might be a firmware fault because the MAC address in memory is corrupted. **RESOLUTION:** Return the telephone to Avaya for repair.
The message light on the telephone turns on and off intermittently, but the telephone never registers.		**CAUSE:** This is a hardware fault. **RESOLUTION:** The telephone must be returned to Avaya for repair.
The telephone stops working in the middle of a call,	**AND** no lights are lit on the telephone and the display is not lit.	**CAUSE:** Loss of power. **RESOLUTION:** Check the connections between the telephone, the power supply, and the power jack. For example, verify that either static addressing was not used or that any changes to static addresses were entered correctly.
	AND power to the telephone is fine (and the telephone might have gone through the restarting sequence).	**CAUSE:** Loss of path to Avaya Media Server, DHCP Lease expired, or DHCP server not available when telephone attempts to renegotiate DHCP lease. **RESOLUTION:** As above.

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Table 4: Operational Error Conditions for 1600 Series IP Telephones (continued)

Condition		Cause/Resolution
The telephone was working, but does not work now,	**AND** no lights are lit on the telephone and the display is not lit.	**CAUSE:** Loss of power. **RESOLUTION:** Check the connections between the telephone, the power supply, and the power jack.
	AND power to the telephone is fine, but there is no dial tone. The display might show “System Busy.”	**CAUSE:** Loss of communication with the call server. **RESOLUTION:** Check LAN continuity from the call server to the telephone using ARP or trace-route and from the telephone to the call server by invoking a Feature button. Verify that LAN administration has not changed for the Gatekeeper, TN 2302AP boards, or the LAN equipment (routers, servers, etc.) between the switch and the telephone. Verify no one changed the telephone settings locally using the **VIEW** and **ADDR** codes, as described earlier in this guide. Verify the telephone volume is set high enough. Finally, conduct a self-test.
	AND the telephone was recently moved.	**CAUSE:** Loss of communication with the call server. **RESOLUTION:** As above, but pay particular attention to the possibility that the telephone is being routed to a different DHCP server, or even a different call server switch. If so, the new server or switch might need to be administered to support the telephone.
	AND the network was recently changed to upgrade or replace servers, re-administer the Avaya Media Server, add or change NAT, etc.	**CAUSE:** Loss of communication with the call server. **RESOLUTION:** As above.

Table 4: Operational Error Conditions for 1600 Series IP Telephones (continued)

Condition		Cause/Resolution
The telephone works, but the audio quality is poor, specifically:		
	the user hears echo when speaking on a handset.	**CAUSE:** Echo from digital-to-analog conversion on your Avaya Media Server trunk. **RESOLUTION:** Verify which trunk is causing the echo, and swap the trunk's Trunk Termination parameter on the call server.
	the user hears echo on a headset, but not on a handset.	**CAUSE:** Improper headset adapter. **RESOLUTION:** Replace adapter with Avaya's M12LU or 3412-HIC adapters. We recommend the M12LU, since it supports Automatic Gain Control.
	the user is on Speaker and hears no echo, but the far-end hears echo.	**CAUSE:** Room acoustics. **RESOLUTION:** Ensure that there are six inches or so of blank space to the right of the telephone. If that is insufficient, use the handset.
	the user experiences sudden silences such as gaps in speech, or static, clipped or garbled speech, etc.	**CAUSE:** Jitter, delay, dropped packets, etc. **RESOLUTION:** You can have the user provide diagnostic data by invoking the Network Information feature under the **A** (Avaya) button on the telephone. One or more Quality of Service (QoS) features should be implemented in the network as covered in Chapter 3: Local Administrative Options. **CAUSE:** Improper non-Category 5 wiring. **RESOLUTION:** Replace non-Category 5 wiring with Category 5 wiring.
	the user hears fluctuations in the volume level which are worse when the Speaker is on, or at the beginning of a call, or when a call goes from no one talking abruptly to a loud voice.	**CAUSE:** The user has changed the Automatic Gain Control (AGC) or environmental acoustics are not consistent with the current audio settings. **RESOLUTION:** Try different on/off settings for the AGCHAND, AGCHEAD, and AGCSPKR parameters.
The telephone works properly except for the Speaker.		**CAUSE:** The Speaker was turned off at the call server. **RESOLUTION:** Administer the call server to allow that station's Speaker to operate. If that does not work, do a self-test on the telephone, as explained in the Self-Test Procedure on page 52.

Table 4: Operational Error Conditions for 1600 Series IP Telephones (continued)

Condition		Cause/Resolution
The telephone works properly, except incoming DTMF tones are not received.		**CAUSE:** The TN2302AP board does not pass in-band DTMF tones. **RESOLUTION:** None; the board is operating as designed.
The telephone works properly, except sidetone DTMF is not heard.		**CAUSE:** call server suppresses sidetone DTMF. **RESOLUTION:** On call server administration, on the Change-System-Parameters screen, enable On-Hook Dialing. If the user has Hands-Free Answer (HFA), answers a call using the Speaker and switches to the handset, pressing dialpad buttons does not send DTMF tones. This is a known bug, and the only current resolution is to disable HFA.
Hands-Free Answer (HFA) is administered but the telephone did not automatically answer a call.		**CAUSE:** HFA only works if the telephone is idle. A second call is ignored if it comes in while a call is in progress, including ringing before the first call is answered. **RESOLUTION:** None.
The HTTP/HTTPS script file and settings file are ignored (not being used by the telephone).		**CAUSE:** The system value AUTH is set to 1 (HTTPS required) but no valid address is specified in TLSSRVR. **RESOLUTION:** Change AUTH to 0 (zero), or enter a valid address for TLSSRVR.
The HTTP/HTTPS script file is ignored or not used by the telephone,	**AND** the HTTP/HTTPS server is a LINUX or UNIX system.	**CAUSE:** The telephone expects lines of the script file to terminate with a **<Carriage Return> <Line Feed>**. Some UNIX applications only terminate lines with **<Line Feed>**. Editing the script file with a UNIX-based editor can strip **<Carriage Return>**s from the file. Doing so causes the entire file to be treated as a comment, and thus be ignored. **RESOLUTION:** Edit the script file with a Windows®-based editor, or another editor that does not strip out the **<Carriage Return>**. **CAUSE:** UNIX and LINUX systems use case-sensitive addressing and file labels. **RESOLUTION:** Verify the file names and path in the script file are accurately specified.
	AND telephone administration recently changed.	**CAUSE:** The ***16xxupgrade.txt*** file was edited incorrectly, renamed, etc. **RESOLUTION:** Download a clean copy of the ***16xxupgrade.txt*** file from the Avaya support Web site at http://www.avaya.com/support, and do not edit or rename it. Customize or change *only* the ***46xxsettings*** file, as discussed in Chapter 4: Maintaining 1600 Series IP Telephones.

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Table 4: Operational Error Conditions for 1600 Series IP Telephones (continued)

Condition		Cause/Resolution
Some settings in the settings file are being ignored while other settings are being used properly.		**CAUSE:** Improper settings file administration. **RESOLUTION:** Verify that customized settings are correctly spelled and formatted.
Some settings in the settings file are being ignored while other settings are being used properly,	**AND** the setting being ignored is one or more of the AGC settings.	**CAUSE:** The user changed the AGC setting(s), which were placed in the backup/restore file of the user. **RESOLUTION:** The user can reset the AGC value(s) back to the desired setting(s), or the backup file can be edited to delete the custom AGC settings.
Telephone power is interrupted while the telephone is saving the application file **and** the HTTP/HTTPS application stops responding.		**CAUSE:** The HTTP/HTTPS server stops responding if power is interrupted while a telephone is saving the application file. **RESOLUTION:** Restart the HTTP/HTTPS server, as applicable.
The user indicates an application or option is not available.		**CAUSE:** The ***46xxsettings*** script file is not pointed to accurately, or is not properly administered to allow the application. **RESOLUTION:** Assuming the user is meant to have that application, verify the 46xxsettings script file is properly specified for your system, including case if your file server is UNIX or LINUX, and extension. Then, verify all the relevant parameters indicated in Table 7 of the *Avaya 1600 Series IP Deskphones Administrator Guide* are accurately specified in the 46xxsettings file.
User data disappeared when the user logged off one telephone and logged into another telephone.		**CAUSE:** The second telephone is unable to access the backup file. **RESOLUTION:** Verify that the first telephone created a backup file by checking that the appropriate administration was done in accordance with Chapter 7 of the *Avaya 1600 Series IP Deskphones Administrator Guide*. Then verify that the second telephone is administered to retrieve data from the same location as the first telephone. Again, check that the appropriate administration was done in accordance with Chapter 7 of the *Avaya 1600 Series IP Deskphones Administrator Guide.* Finally, verify that the HTTP server on which the backup file is located is operational and accessible from the second telephone.

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Table 4: Operational Error Conditions for 1600 Series IP Telephones (continued)

Condition		Cause/Resolution
The user reports BM32 buttons are not labeled when they should be.		**CAUSE:** Improper administration on the call server. **RESOLUTION:** Verify correct administration.
The user reports personalized labels cannot be placed on the BM32 buttons,	**AND** the user has tried using the Program AD button feature.	**CAUSE:** Improper administration on the call server. **RESOLUTION:** Verify correct administration.
	AND the user has tried using the Personalize Labels option on the telephone.	**CAUSE:** The user has been pressing the BM32 button to indicate which button to relabel. **RESOLUTION:** Relabeling is not supported on the BM32.

Appendix A: Restart Scenarios

Scenarios for the Restart Process

The sequence of the restart process depends on the status of the boot and application files. This appendix explains the different scenarios possible.

Note:

The file names used in this appendix are examples only. Your particular file names are likely to be different.

Restart the Telephone

Use the following procedure to restart the telephone.

1. While the telephone is on-hook and idle, press the following sequence of keys on the faceplate of the telephone:

   Mute 7 3 7 3 8 # (Mute R E S E T #)

   Note:

   Press the **Mute** button momentarily. Do not press this key while pressing other keys.

   The following text displays left-justified at the top of the display:

   ```
   Reset values?
   *=no #=yes
   ```

2. Press the **#** button to continue the procedure.

   The following text displays left-justified at the top of the display while the system values are reset to defaults:

   ```
   Resetting
   values.
   ```

   Once you press the * button to restart without resetting the values, the following prompt displays:

   ```
   Restart phone?
   *=no #=yes
   ```

3. Press the * key to terminate the procedure without restarting the telephone.

   Press the # key to restart the telephone.

   The remainder of the procedure depends on the status of the boot and application files:

If this condition applies:	See:
Boot File Needs to be Upgraded	Boot File Needs to be Upgraded on page 83.
Latest Boot File Loaded/No Application File or Application File Needs to be Upgraded	Latest Boot File Loaded/No Application File or Application File Needs to be Upgraded on page 86.
Latest Boot File and System-Specific Application File Already Loaded	Latest Boot File and System-Specific Application File Already Loaded on page 88.

Boot File Needs to be Upgraded

The telephone automatically downloads an upgraded boot file if applicable. In this case, these messages appear:

The telephone displays:

```
Restarting...
```

While the hardware is being initialized, the telephone displays:

```
Initializing
```

While either the application file if there is one or the boot code is uncompressed into RAM, the telephone displays:

```
Loading: 5 secs
replboot_v3.app     4084KB
```

This message counts the seconds as the application file (replboot_v3.app in this example) is being written into RAM.

When control is passed to the software that was just loaded, the following messages display:

```
Starting...
```

```
Updating boot code...
DO NOT UNPLUG THE PHONE!
```

This message continues while the new boot code is being written into RAM.

The telephone displays the speed of the Ethernet interface in Mbps, that is, 0, 10, or 100. The message `No Ethernet` displays until the software determines whether the interface is 10 Mbps or 100 Mbps.

Note:

The Ethernet speed indicated is the LAN interface speed for both the telephone and any attached PC, assuming the administrator has not disabled the latter interface through the PHY2STAT setting.

The software determines whether sufficient IP address information was downloaded. In this scenario, it is discovered that sufficient information has **not** been downloaded. The following message displays while the DHCP process is invoked:

```
DHCP: 0 secs
* to program
```

The number of elapsed seconds is incremented once per second, until DHCP successfully completes.

While the IP telephone establishes a TCP connection to the HTTP server, the telephone displays the following message:

```
HTTP:n ipadd
```

where ***n*** is the number of the IP address obtained from the HTTP server and ***ipadd*** is the IP address.

The following message displays while the HTTP process is invoked:

```
HTTP: n uri
```

The number increments once per second, until the HTTP server responds.

While the upgrade script file is being downloaded, all IP telephones display the following message:

```
HTTP:n sc etag
```

where ***n*** is the number of the IP address obtained from the HTTP server, *sc* is the status code of the HTTP response and *etag* is the value of the ETag header.

The script file is processed. The software determines that the telephone's boot code file name (BOOTNAME) is not the latest version. APPNAME is set to the name of an

application file to replace the boot code. The following message displays while the application file is downloaded into RAM:

```
app_filename
n KB received
```

where ***n*** is the number of KBs downloaded.

The following message displays while the application file is stored in flash memory:

```
Saving to flash
n%, x secs
```

where ***n*** is the percentage of the file stored, and ***x*** is the number of elapsed seconds. This usually takes longer than the file download.

The following message displays while the telephone is reset so the application file can be executed:

```
Restarting...
```

While the boot code is rewritten, the telephone displays:

```
Updating...
n%, x secs
```

where ***n*** is the percentage of boot code rewritten and ***x*** is the number of elapsed seconds during rewriting.

When the new boot code is successfully written into the flash memory, the application corrupts its own checksum stored in flash. The application then resets the telephone so the latest system-specific application file can be downloaded.

Continue with the next procedure.

Latest Boot File Loaded/No Application File or Application File Needs to be Upgraded

This procedure occurs with normal application file upgrades.

The telephone displays:

```
Restarting...
```

The telephone detects and displays the speed of the Ethernet interface in Mbps, that is, 0, 10, or 100. The message `No Ethernet` displays until the software determines whether the interface is 10 Mbps or 100 Mbps.

Note:

The Ethernet speed indicated is the LAN interface speed for both the telephone and any attached PC.

The software determines whether sufficient IP address information was downloaded. In this scenario, it is discovered that sufficient information has **not** been downloaded. The following message displays while the DHCP process is invoked:

```
DHCP: 0 secs
* to program
```

The number of elapsed seconds is incremented once per second, until DHCP successfully completes.

While the IP telephone establishes a TCP connection to the HTTP server, the telephone displays the following message:

```
HTTP:n ipadd
```

where ***n*** is the number of the IP address obtained from the HTTP server and ***ipadd*** is the IP address.

The following message displays while the HTTP process is invoked:

```
HTTP: n uri
```

The number increments once per second, until the HTTP server responds.

While the upgrade script file is being downloaded from the HTTP server, all IP telephones display the following message:

```
HTTP:n sc etag
```

where ***n*** is the number of the IP address obtained from the HTTP server, *sc* is the status code of the HTTP response and *etag* is the value of the ETag header.

The script file is processed. The software determines that the name of the boot code file in the telephone (BOOTNAME) is not the latest version. APPNAME is set to the name of an

application file to replace the boot code. The following message displays while the application file is downloaded into RAM:

```
app_filename
n KB received
```

where ***n*** is the number of KBs downloaded.

The following message displays while the application file is stored in flash memory:

```
Saving to flash
n%, x secs
```

where ***n*** is the percentage of the file that was stored, and ***x*** is the number of elapsed seconds. This usually takes longer than the file's download.

The telephone is reset so the new system-specific application file can be executed.

Continue with the next procedure.

Latest Boot File and System-Specific Application File Already Loaded

This happens with normal resets.

The telephone displays:

```
Restarting...
```

The telephone detects and displays the speed of the Ethernet interface in Mbps, that is, 0, 10, or 100. The message `No Ethernet` displays until the software determines whether the interface is 10 Mbps or 100 Mbps.

Note:

The Ethernet speed indicated is the LAN interface speed for both the telephone and any attached PC.

The software determines whether sufficient IP address information was downloaded. In this scenario, it is discovered that sufficient information has **not** been downloaded. The following message displays while the DHCP process is invoked:

```
DHCP: 0 secs
* to program
```

The number of elapsed seconds is incremented once per second, until DHCP successfully completes.

While the IP telephone establishes a TCP connection to the HTTP server, the telephone displays the following message:

```
HTTP:n ipadd
```

where ***n*** is the number of the IP address obtained from the HTTP server and ***ipadd*** is the IP address.

The following message displays while the HTTP process is invoked:

```
HTTP: n uri
```

The number increments once per second, until the HTTP server responds.

While the upgrade script file is being downloaded from the HTTP server, all IP telephones display the following message:

```
HTTP:n sc etag
```

where ***n*** is the number of the IP address obtained from the HTTP server, *sc* is the status code of the HTTP response and *etag* is the value of the ETag header.

The script file is processed. The software determines that the name of the boot code file in the telephone (BOOTNAME) is the latest version, and the name of the application file in the telephone is the same as APPNAME.

System-specific registration with the Avaya media server is invoked.

When registration finishes, a dial tone is available on the telephone.

Appendix B: Glossary of Terms

Terms Used in This Guide

802.1P **802.1Q**	802.1Q defines a layer 2 frame structure that supports VLAN identification and a QoS mechanism usually referred to as 802.1P.
802.1X	Authentication method for a protocol requiring a network device to authenticate with a back-end Authentication Server before gaining network access. Applicable 1600 Series IP Telephones support IEEE 802.1X for pass-through and for Supplicant operation with the EAP-MD5 authentication method.
ARP	Address Resolution Protocol, used, for example, to verify that the IP address provided by the DHCP server is not in use by another IP telephone.
CLAN	Control LAN, type of Gatekeeper circuit pack.
DHCP	Dynamic Host Configuration Protocol, an IETF protocol used to automate IP address allocation and management.
DiffServ	Differentiated Services, an IP-based QoS mechanism.
DNS	Domain Name System, an IETF standard for ASCII strings to represent IP addresses. The Domain Name System (DNS) is a distributed Internet directory service. DNS is used mostly to translate between domain names and IP addresses. Avaya 1600 Series IP Telephones can use DNS to resolve names into IP addresses. In DHCP, TFTP, and HTTP files, DNS names can be used wherever IP addresses were available as long as a valid DNS server is identified first.
Gatekeeper	H.323 application that performs essential control, administrative, and managerial functions in the media server. Sometimes called CLAN in Avaya documents.
H.323	A TCP/IP-based protocol for VoIP signaling.
HTTP	Hypertext Transfer Protocol, used to request and transmit pages on the World Wide Web.
HTTPS	A secure version of HTTP.
IETF	Internet Engineering Task Force, the organization that produces standards for communications on the internet.
LAN	Local Area Network.
MAC	Media Access Control, ID of an endpoint.
QoS	Quality of Service, used to refer to several mechanisms intended to improve audio quality over packet-based networks.
Unnamed Registration	Registration with Avaya Aura Communication Manager by an IP telephone with no extension. Allows limited outgoing calling.
TLS	Transport Layer Security, an enhancement of Secure Sockets Layer (SSL). TLS is compatible with SSL 3.0 and allows for privacy and data integrity between two communicating applications.
Unnamed Registration	Registration with Avaya Aura Communication Manager by an IP telephone with no extension. Allows limited outgoing calling.
VLAN	Virtual LAN.
VoIP	Voice over IP, a class of technology for sending audio data and signaling over LANs.

Appendix C: Related Documentation

IETF Documents

The following documents provide standards relevant to IP Telephony and are available for free from the IETF Web site:

- *Requirements for Internet Hosts - Communication Layers*, October 1989, by R. Braden (STD 3: RFC 1122)
- *Requirements for Internet Hosts - Application and Support*, October 1989, by R. Braden (STD 3: RFC 1123)
- *Internet Protocol (IP)*, September 1981, by Information Sciences Institute (STD 5: RFC 791), as amended by *Internet Standard Subnetting Procedure*, August 1985, by J. Mogul and J. Postel (STD 5: RFC 950)
- *Broadcasting Internet Datagrams*, October 1984, by J. Mogul (STD 5: RFC 919)
- *Broadcasting Internet Datagrams in the Presence of Subnets*, October 1984, by J. Mogul (STD 5: RFC 922)
- *User Datagram Protocol (UDP)*, August 28, 1980, by J. Postel (STD 6: RFC 768)
- *Transmission Control Protocol (TCP)*, September 1981, by Information Sciences Institute (STD 7: RFC 793)
- Domain Names - Concepts and Facilities (DNS), November, 1987, by P. Mockapetris (STD 13: RFC 1034)
- Domain Names - Implementation and Specification (DNS), November 1987, by P. Mockapetris (STD 13: RFC 1035)
- *An Ethernet Address Resolution Protocol (ARP)*, November 1982, by David C. Plummer (STD 37: RFC 826)
- *Dynamic Host Configuration Protocol (DHCP)*, March 1997, by R. Droms (RFC 2131)
- *DHCP Options and BOOTP Vendor Extensions*, March 1997, by S. Alexander and R. Droms (RFC 2132)
- *RTP: A Transport Protocol for Real-Time Applications (RTP/RTCP)*, January 1996, by H. Schulzrinne, S. Casner, R. Frederick, V. Jacobson (RFC 1889)
- *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*, *(DIFFSRV)*, December 1998, by K. Nichols, S. Blake, F. Baker and D. Black (RFC 2474)
- *Management Information Base for Network Management of TCP/IP Internets: MIB-II,* March 1991, edited by K. McCloghrie and M. Rose (RFC 1213)

- *SNMPv2 Management Information Base for the Internet Protocol using SMIv2,* November 1996, edited by K. McCloghrie (RFC 2011)
- *Structure of Management Information Version 2 (SMIv2),* April 1999, edited by K. McCloghrie, D. Perkins, and J. Schoenwaelder (RFC 2578)
- *Resource ReSerVation Protocol VI*, September 1997, by R. Braden, L. Zhang, S. Berson, S. Herzog, and S. Jamin (RFC 2205)
- *The TLS Protocol Version 1.0,* January 1999, by T. Dierks and C. Allen (RFC 2246)

ITU Documents

The following documents are available for a fee from the ITU Web site: http://www.itu.int**.**

- *Recommendation G.711, Pulse Code Modulation (PCM) of Voice Frequencies*, November 1988
- *Recommendation G.722, 7 kHz Audio-Coding within 64 kbit/s*, November 1988
- *Recommendation G.729, Coding of speech at 8 kbit/s using Conjugate-Structure Algebraic-Code-Excited Linear-Prediction (CS-ACELP)*, March 1996
- *Annex A to Recommendation G.729: Reduced complexity 8 kbit/s CS-ACELP speech codec*, November 1996
- *Annex B to Recommendation G.729: A silence compression scheme for G.729 optimized for terminals conforming to Recommendation V.70*, November 1996
- *Recommendation H.225.0, Call signalling protocols and media stream packetization for packet-based multimedia communications systems*, February 1998
- *Recommendation H.245, Control protocol for multimedia communication*, February 1998
- *Recommendation H.323, Packet-based multimedia communications systems*, February 1998

ISO/IEC, ANSI/IEEE Documents

The following documents are available for a fee from the ISO/IEC standards Web site:

- *International Standard ISO/IEC 8802-2:1998 ANSI/IEEE Std 802.2, 1998 Edition, Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks- Specific requirements- Part 2: Logical Link Control*
- *ISO/IEC 15802-3: 1998 ANSI/IEEE Std 802.1D, 1998 Edition, Information technology- Telecommunications and information exchange between systems- Local and metropolitan area networks- Common specifications- Part 3: Media Access Control (MAC) Bridges*
- *IEEE Std 802.1Q-1998, IEEE Standards for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks*
- *IEEE Std 802.3af-2003, IEEE Standard for Information technology- Telecommunications and information exchange between systems- Local and metropolitan area networks- Specific requirements- Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications- Amendment: Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)*

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